Gas Journal

VOL. 284. 107th YEAR. LONDON, OCTOBER 19, 1955 No. 4829. PRICE 1/6

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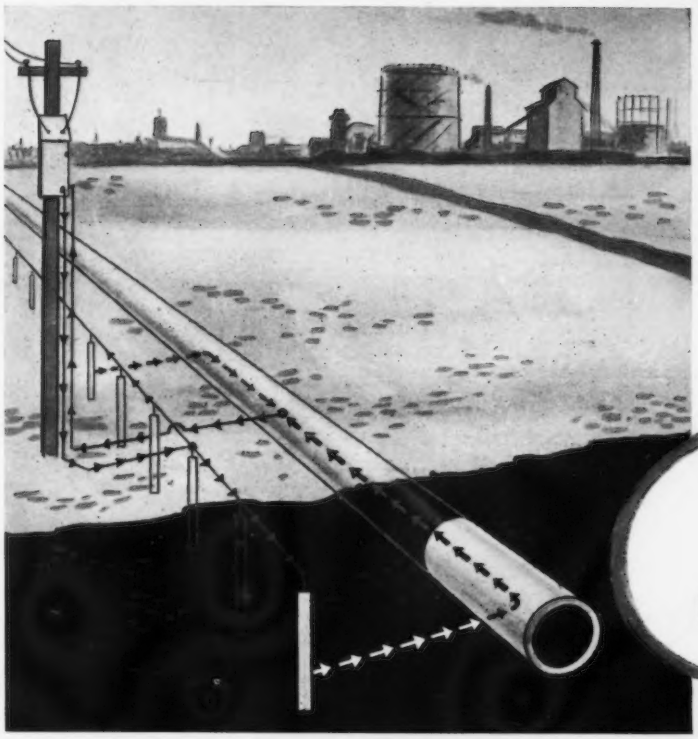

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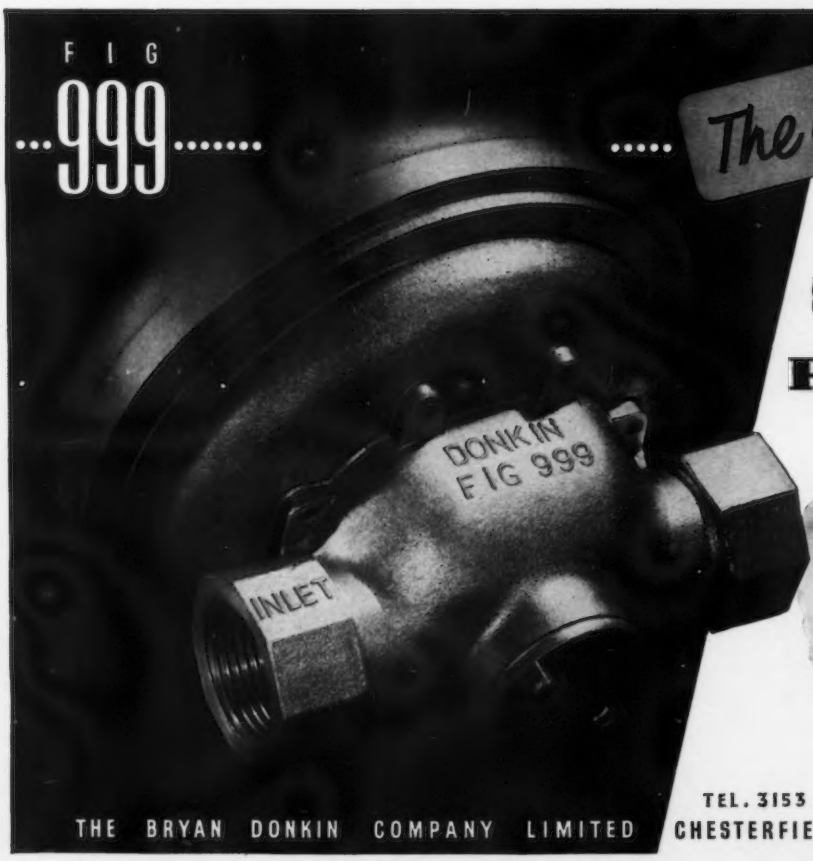

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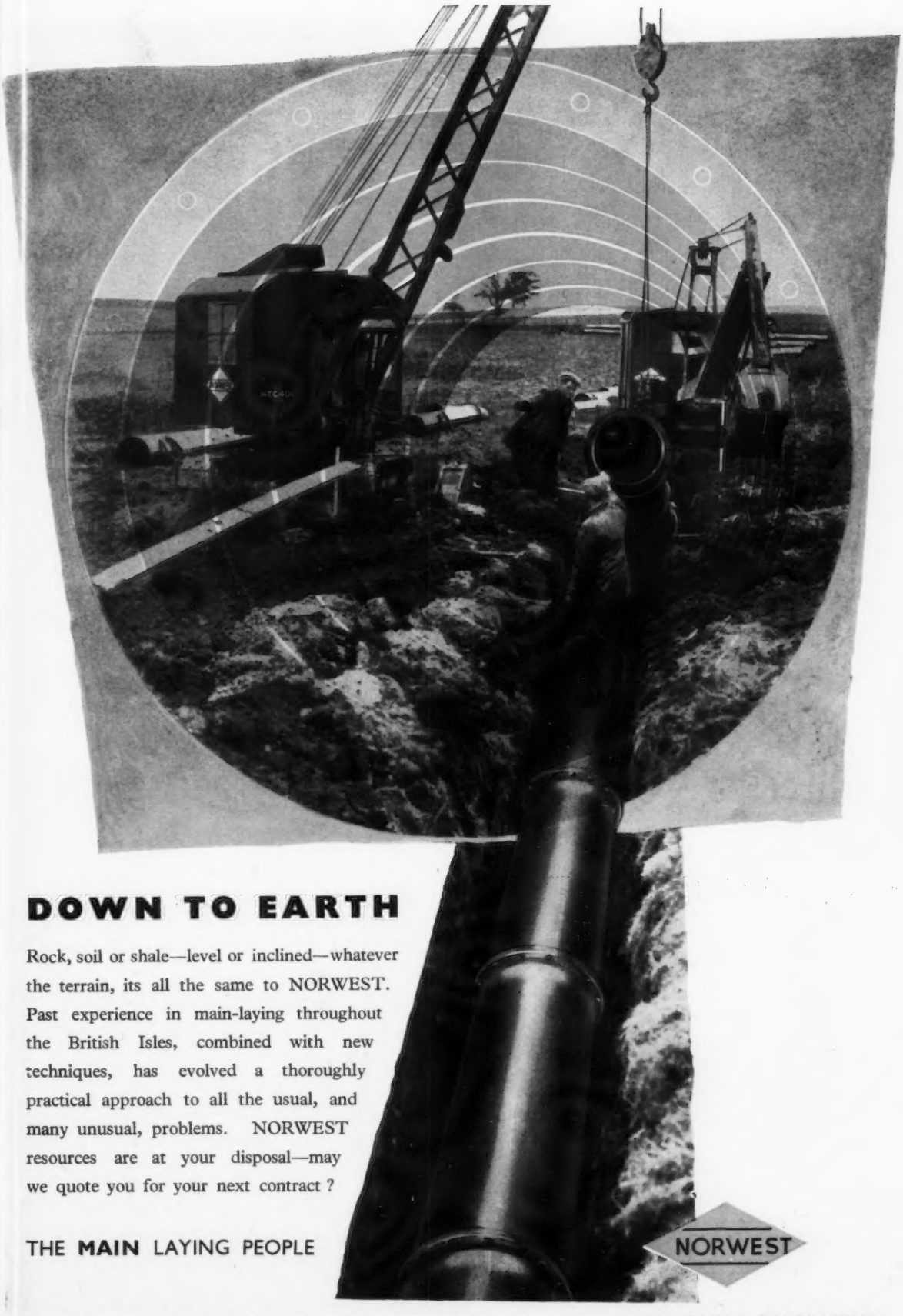

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Rock, soil or shale—level or inclined—whatever the terrain, its all the same to NORWEST. Past experience in main-laying throughout the British Isles, combined with new techniques, has evolved a thoroughly practical approach to all the usual, and many unusual, problems. NORWEST resources are at your disposal—may we quote you for your next contract ?

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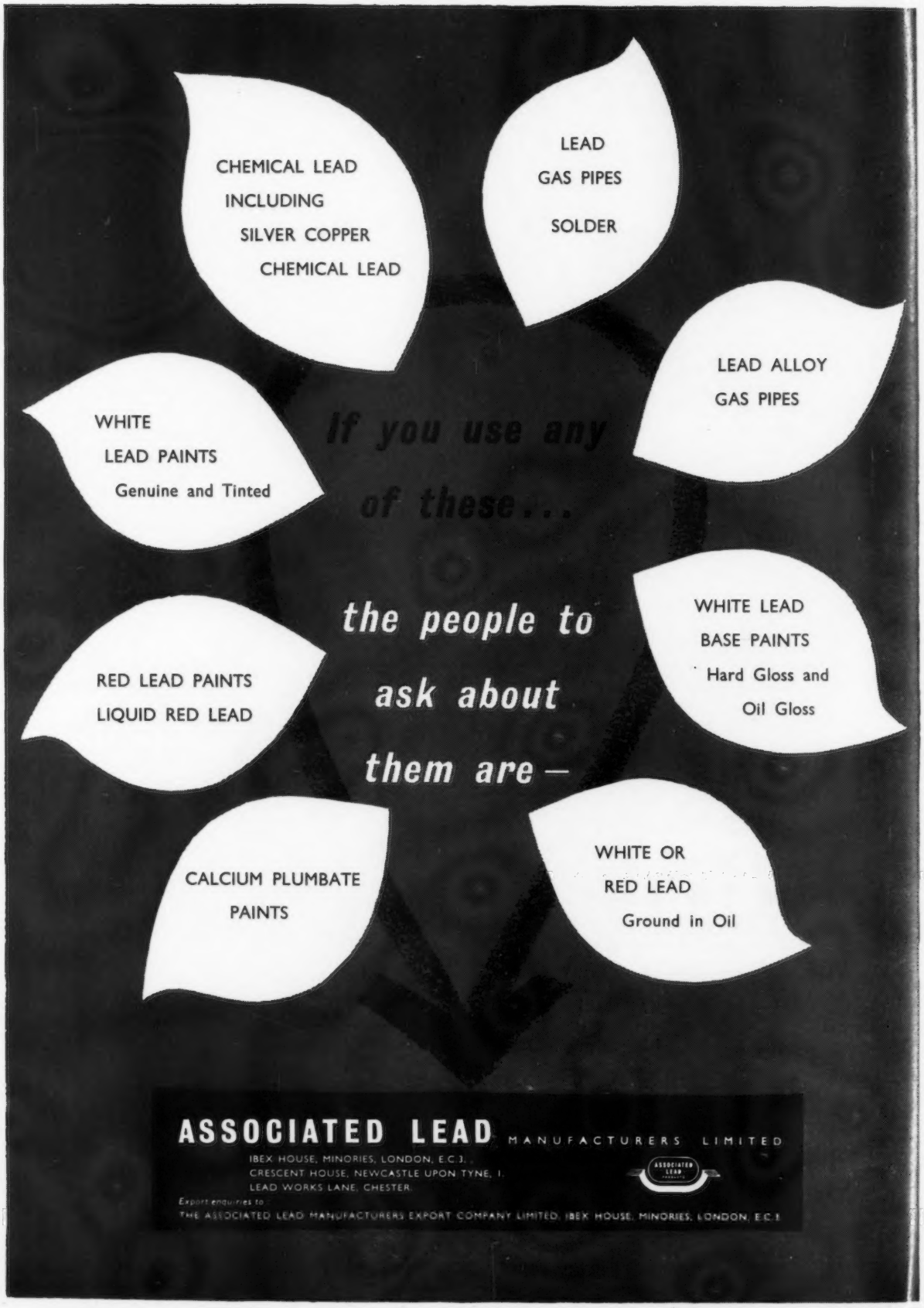
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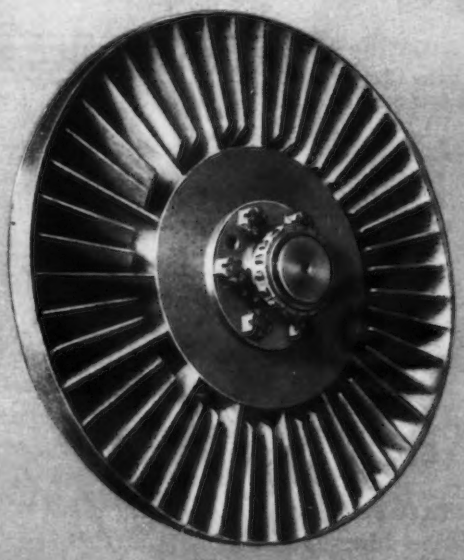

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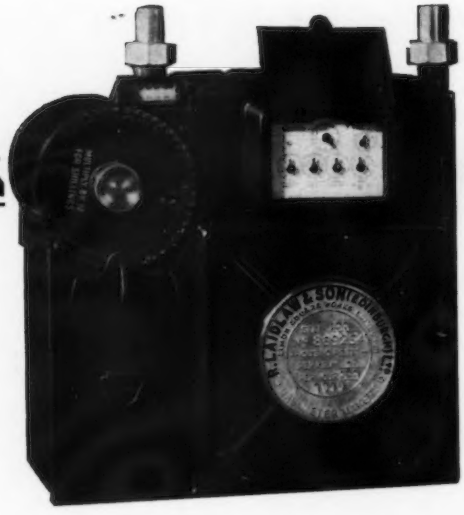

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- **Sizes ¾" to 2"**
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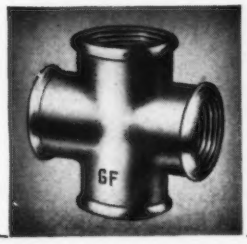

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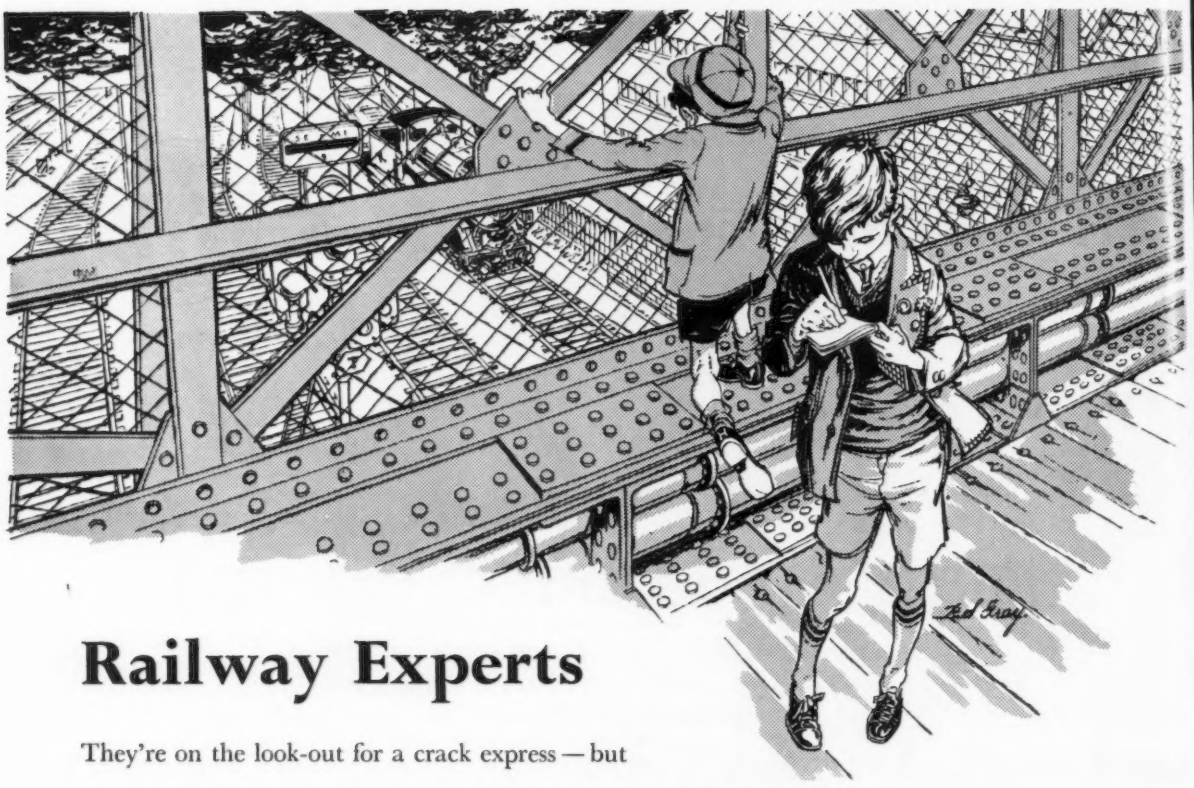

Railway Experts

They're on the look-out for a crack express — but they call it a 'streak'. Below them, a stolid shunting engine rolls unnoticed into a factory siding, hauling its vital load of raw material. The story of these factory sidings — hundreds of them up and down the country — is the story of Britain's industrial development. It is a story in which the Thos. W. Ward organisation has played an important role, for many of these private railways have been built by Wards. Wards hold an unrivalled position in the specialised field of laying and maintaining industrial railway sidings. They can advise on and contract for installations of every kind, ranging from a simple run-in to an intricate network. Wherever rails are needed to move the goods, Wards are the people to provide them.

Rails and sidings are just one activity of the Ward Group of Companies; their products and services cover almost every branch of industry.

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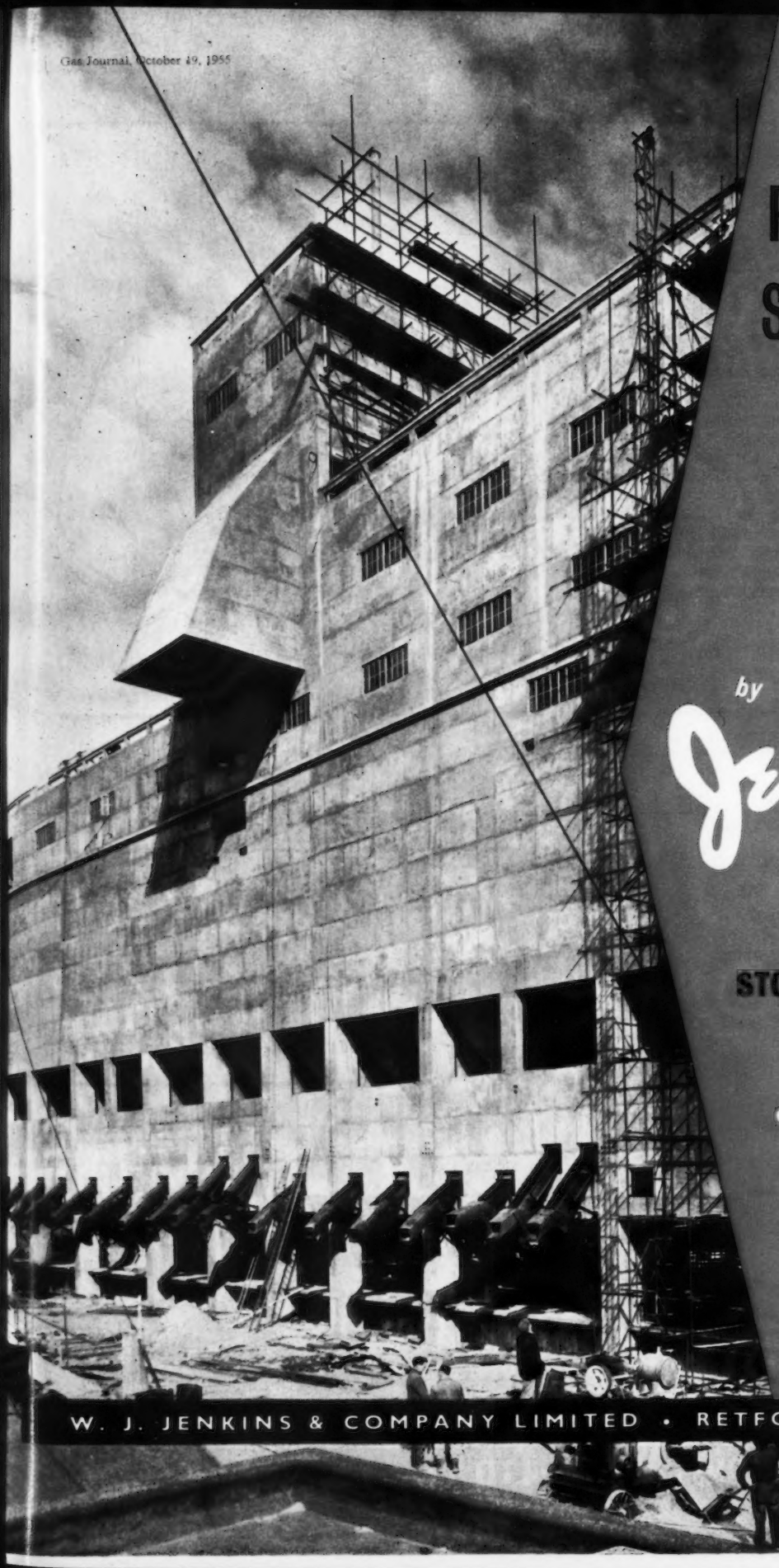

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STORAGE CAPACITY
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SELF-CONTAINED BREATHING APPARATUS for work in irrespirable atmospheres. Oxygen and Compressed Air types
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12/21 MODEL FOR NARROW TRENCHES

The answer to all your trenching problems

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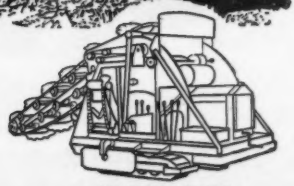
For narrow trenches we supply the 12/21 model, and for wide trenches the 16/60 model. Both models are a fine engineering job and capable of standing up to continuous hard work. We shall be pleased to send you further information and fully illustrated brochures on request.



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Are pleased to inform the Gas Industry that adequate supplies of the necessary raw materials are now available for the manufacture of increased quantities of

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They are therefore in a position to supply all normal requirements of this well-known purifying material and can offer prompt delivery by road or rail.

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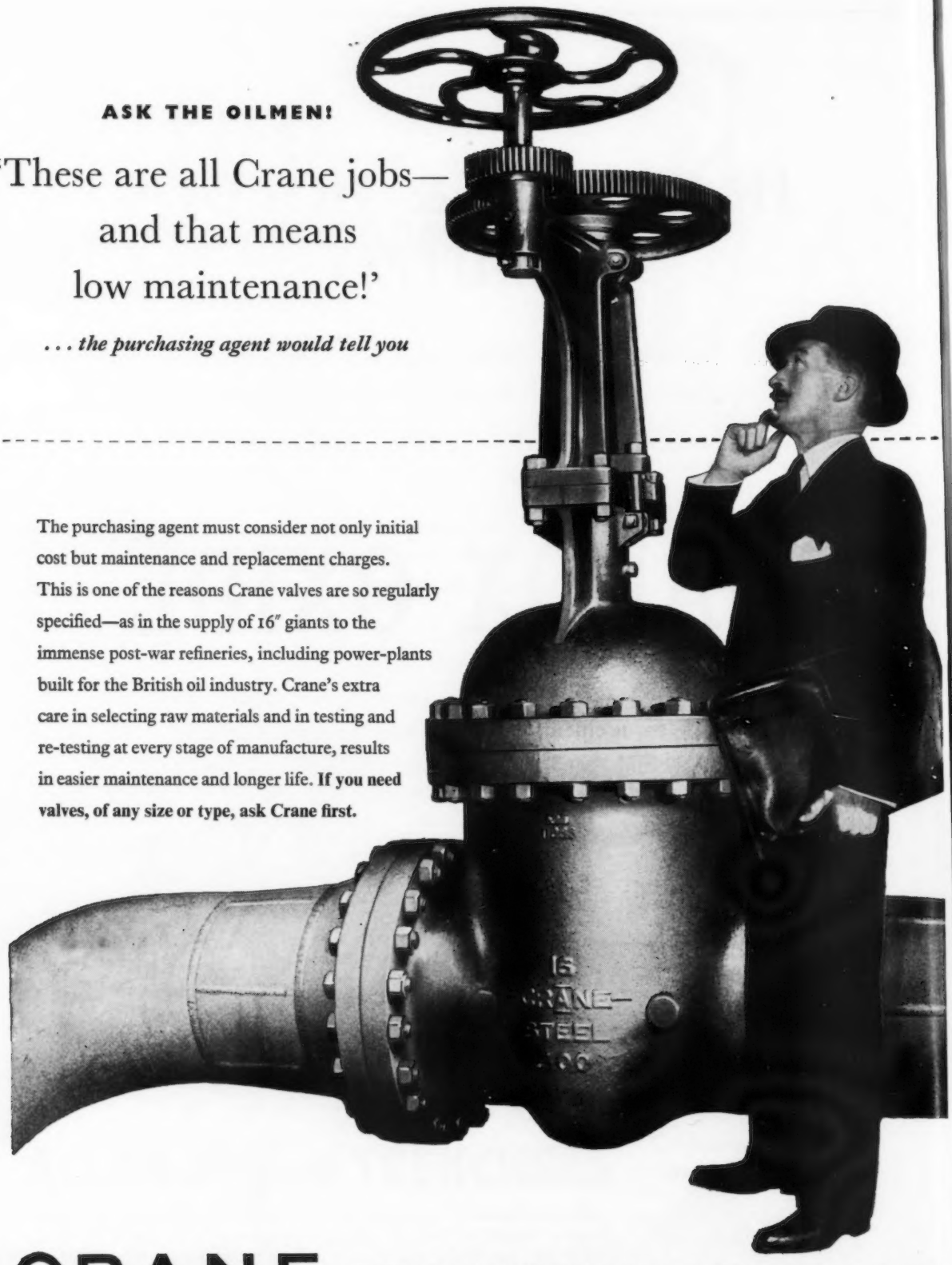
ASK THE OILMEN!

'These are all Crane jobs—and that means low maintenance!'

. . . the purchasing agent would tell you



The purchasing agent must consider not only initial cost but maintenance and replacement charges. This is one of the reasons Crane valves are so regularly specified—as in the supply of 16″ giants to the immense post-war refineries, including power-plants built for the British oil industry. Crane's extra care in selecting raw materials and in testing and re-testing at every stage of manufacture, results in easier maintenance and longer life. **If you need valves, of any size or type, ask Crane first.**

CRANE **VALVES OF BRONZE, CAST IRON & CAST STEEL**

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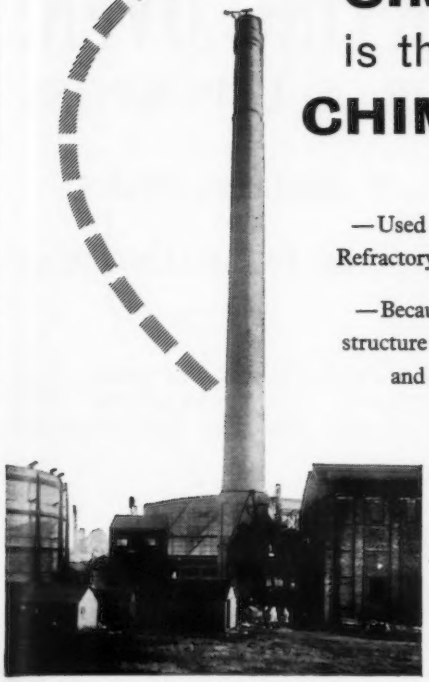
CRANE LTD. 45-51 LEMAN STREET, LONDON, E.1. Works: IPSWICH · *Branches: Birmingham, Brentford, Bristol, Glasgow, Manchester.*

CIMENT FONDU
is the Ideal Cement for
CHIMNEY LININGS

—Used according to temperature conditions with Refractory, Insulating or Non-Refractory aggregates.

—Because it protects the steel, brick or concrete structure against attack by heat and by the acidity and sulphates from the combustion gases.



Wallasey Power Station. Ciment Fondu mortar was used for the jointing of the interior brickwork of this chimney.

Shell's Shellhaven Refinery, Essex. These 9 ft. diameter steel stacks have been lined with Ciment Fondu insulating concrete.

Battersea Power Station where chimneys have been lined with Ciment Fondu mortar.

Table Bay Power Station, South Africa. Chimneys gunited with Ciment Fondu mortar.

REFRACTORY CONCRETE
The adaptable Refractory material made with crushed firebrick and **CIMENT FONDU**

CIMENT FONDU
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CONCRETE ROCK-HARD WITHIN ONE DAY

REMEMBER POPPY DAY

Ciment Fondu is manufactured by

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You are invited to write for further details and photographic examples

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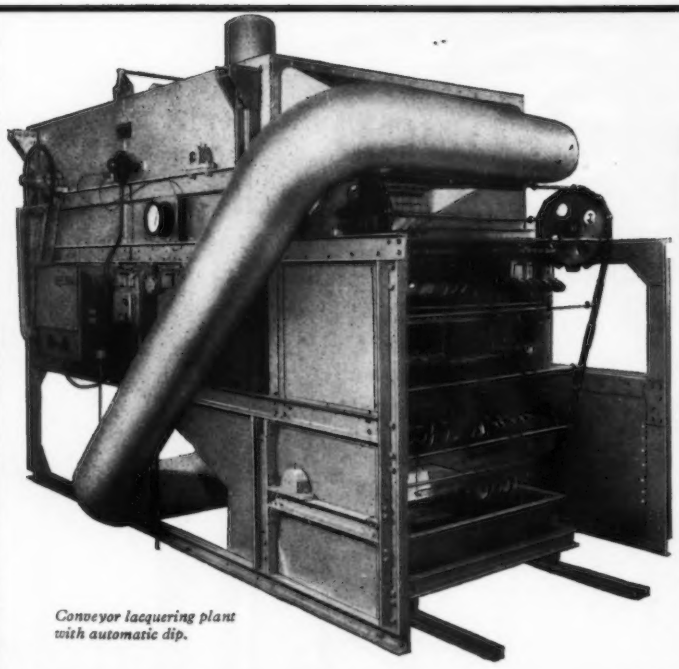

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Just as gas plays an important part in the manufacture of Osram lamps, so can Osram tungsten lamps and fluorescent tubes make a valuable contribution to the gas industry wherever electric light is used. Osram lamps and tubes are made by the G.E.C.—the largest British electrical manufacturing organisation—with all the skill, knowledge and experience so closely associated with this great firm.

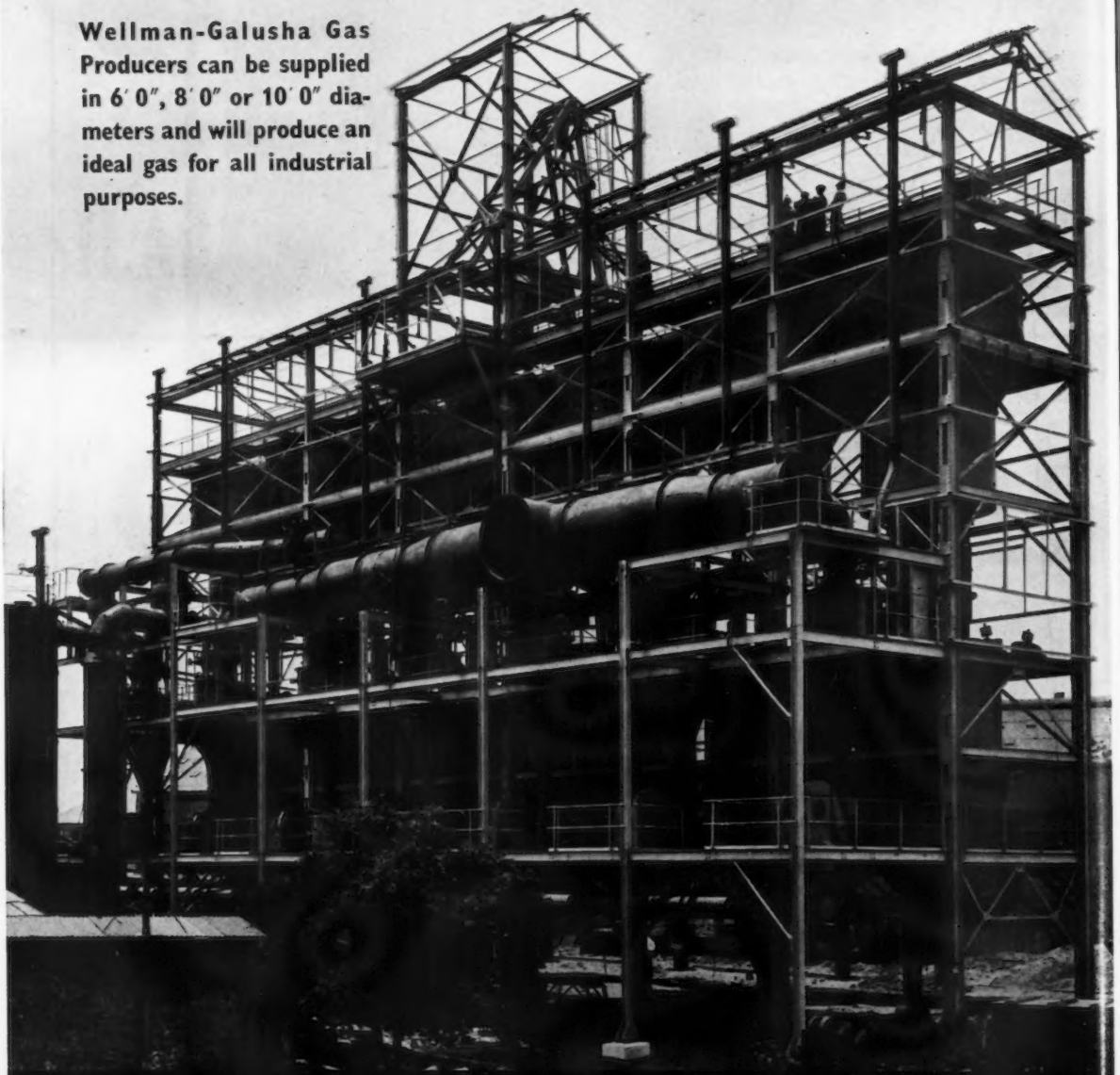
for THE GAS INDUSTRY

A G.E.C. PRODUCT. THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Wellman-Galusha Gas Producers

A battery of seven 10′ 0″ diameter Wellman-Galusha Gas Producers, for gasifying Natal anthracite coal—under construction at Vereeniging, Transvaal, South Africa. The installation is one of the most extensive gas producer plants to be erected initially as one battery in the British Commonwealth.

Wellman-Galusha Gas Producers can be supplied in 6′ 0″, 8′ 0″ or 10′ 0″ diameters and will produce an ideal gas for all industrial purposes.



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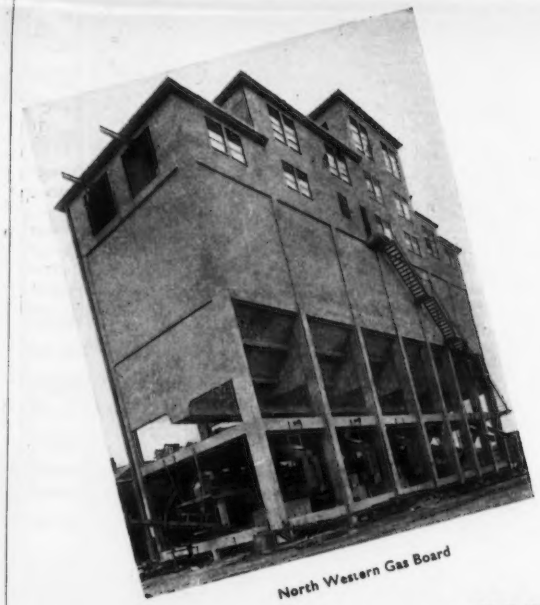
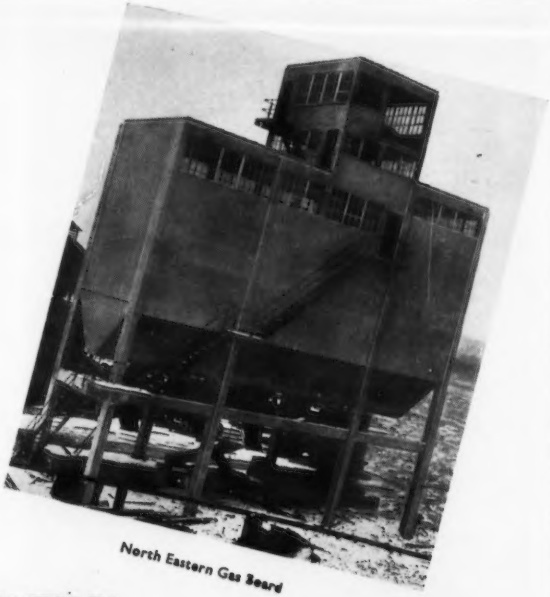


North Western Gas Board

North Thames Gas Board



North Eastern Gas Board

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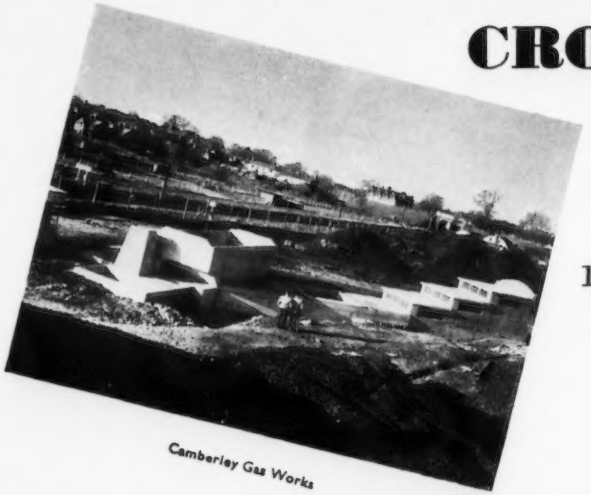

Camberley Gas Works

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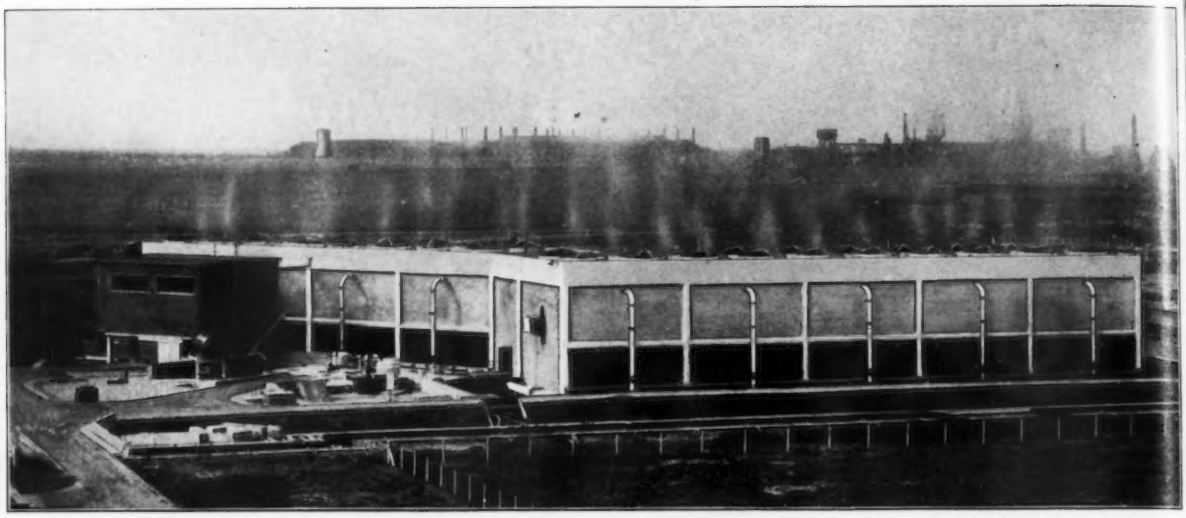
South Eastern Gas Board



THE ABOVE ILLUSTRATION DEPICTS A WATER COOLING TOWER INSTALLATION OF THE MECHANICAL INDUCED DRAUGHT TYPE. TO ACHIEVE THE VERY EXACTING DUTY SPECIFIED A TOTAL OF 36 FANS ARE EMPLOYED WHICH ARE SITUATED IN THE ROOFS OF THE TOWERS. THE INTERNAL FILLING IS EXCEPTIONALLY COMPACT, CONTAINS THE LATEST IMPROVEMENTS AND IS SO DESIGNED TO MINIMISE OPERATIONAL COSTS. IN THE BACKGROUND TOWARDS THE LEFT CAN BE SEEN A 160 FEET HIGH NATURAL DRAUGHT HYPERBOLIC TOWER FOR A SERVICE REQUIRING A LESS STRINGENT PERFORMANCE.

THESE UNITS ARE ALL PRODUCTS OF

THE DAVENPORT ENGINEERING Co. LIMITED

BRADFORD

WHOSE SPECIALITY IS THE DESIGN AND CONSTRUCTION OF

WATER COOLING PLANTS

STEAM TURBINES

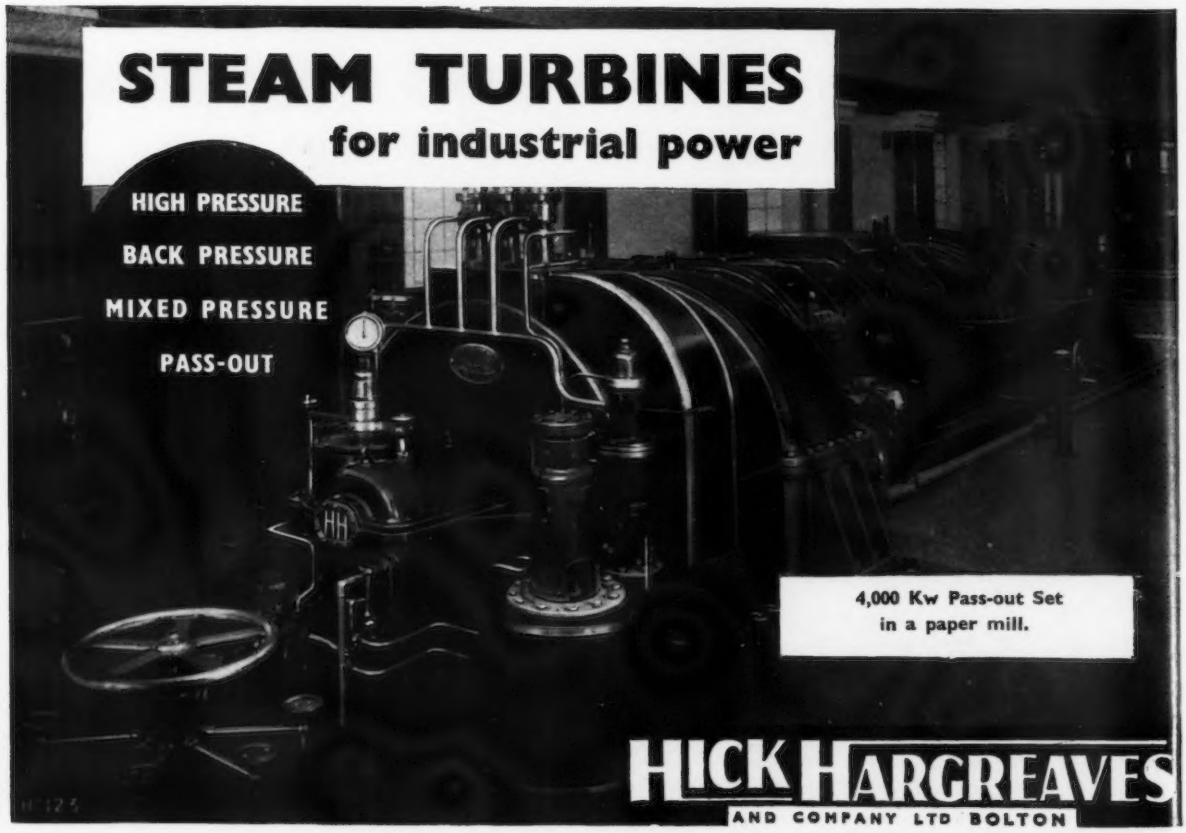
for industrial power

HIGH PRESSURE

BACK PRESSURE

MIXED PRESSURE

PASS-OUT



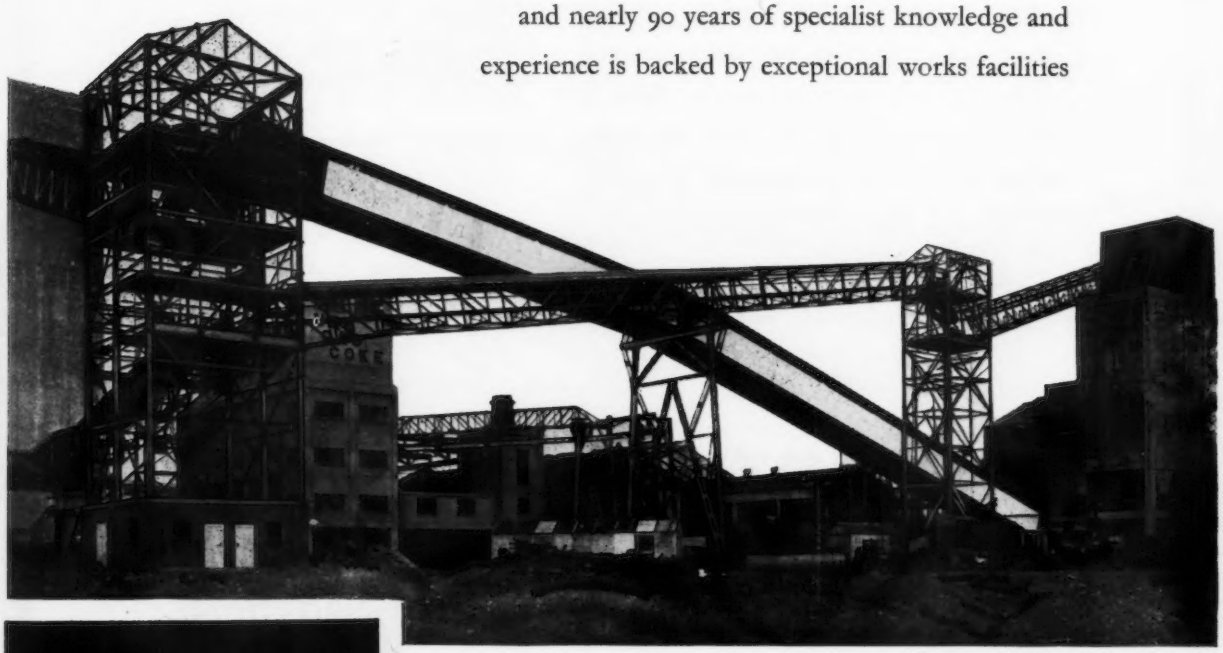
4,000 Kw Pass-out Set in a paper mill.

HICK HARGREAVES

AND COMPANY LTD BOLTON

craftsmanship in steel...

Developments now taking place within the Gas Industry are designed to give benefits to industrial and public consumers alike. Long before these developments are complete and the benefits realised, detailed planning is called for in a multitude of ways. Not least is the supply and fabrication of structural steelwork and this has been Walker Bros. contribution to the new gas-making plant at the Walsall Works of the West Midlands Gas Board. We are highly organised to tackle any structural steelwork problem, large or small, and nearly 90 years of specialist knowledge and experience is backed by exceptional works facilities



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WALKER BROS
LIMITED
Structural Engineers

if it can be built in steel—we can build it

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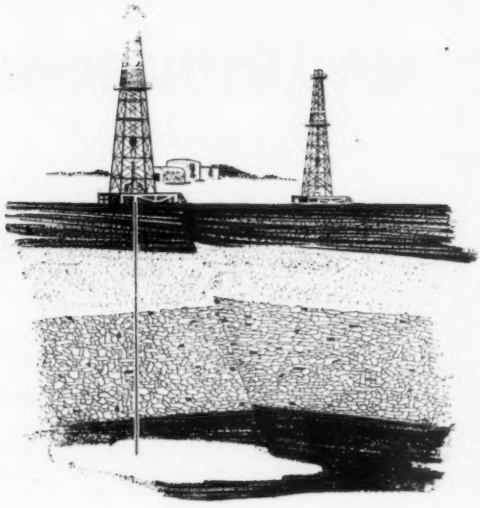

Not just below the surface...

"Gold is where you find it."

But in the search for "black gold", haphazard drilling is so costly and so unrewarding, that the importance of controlled penetration is paramount. In common with the oil-drill, Frysol Flux penetrates quickly, yet goes no deeper than doing the job properly demands. Special additives in Frysol not only ensure rapid solder flow, and maximum bonding, but also make certain that the surface texture of the base metals are unaffected.

Specify Frysol, the balanced, economical flux by FRY'S for your soldering operations.

Export enquiries invited.

FRYSOL fluxes

for soldering all metals—FRY'S *make the grade*

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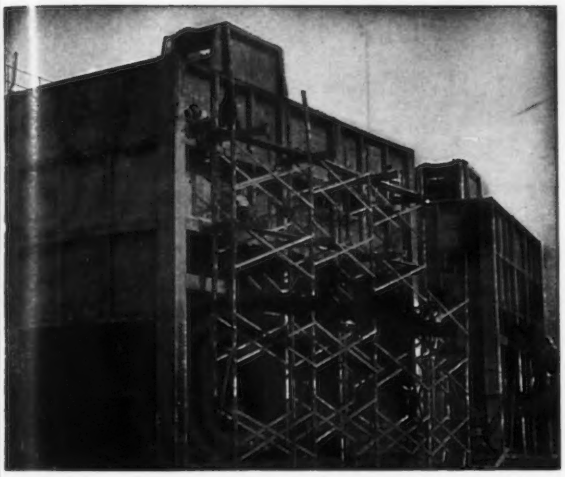
Gunite



One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

For lining coal bunkers and steel chimneys it possesses great resistance to corrosion and protects steel-work from the abrasive action of coal or coke.

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Handbook "GUNITE" sent on request

How often it has happened. A leak detected . . . the trench left open . . . waiting for leak clamps to be delivered for fitting. Little wonder that progressive undertakings today insist upon testing and repair gangs carrying C.P. Leak Clamps with their equipment. The result? Leak detected and repaired in one operation . . . *permanently* repaired because flexibility in the joint is provided for without any sacrifice of sealing efficiency. Remember—C.P. LEAK CLAMPS embody the experience and development which comes from having manufactured over 50,000 Clamps in this country.

These wasted man-hours can be saved by stocking CP Leak Clamps

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A NEW CONDUIT BENDER
—by HILMOR

The No. 4 Three Point Bender with ratchet actuated ram, adjustable bending head and degree of bend indicator. A sturdy, light-weight machine designed to give long and trouble free service under all conditions.

NDS: ¼", ⅜", ½", ¾" and 1" gas a steam. (Also ⅝" to 1½" O.D. electrical conduit.)

NOTE THESE FEATURES

- Speedy and accurate bending with minimum of manual effort.
- Produces good quality bends — sets, double sets, saddle bends, etc.
- Absence of top plate obstruction permits production of bends in similar or different planes with minimum of straight between adjacent bends.
- Designed for bolting to bench, holding in vice or mounting on portable stand with detachable legs.

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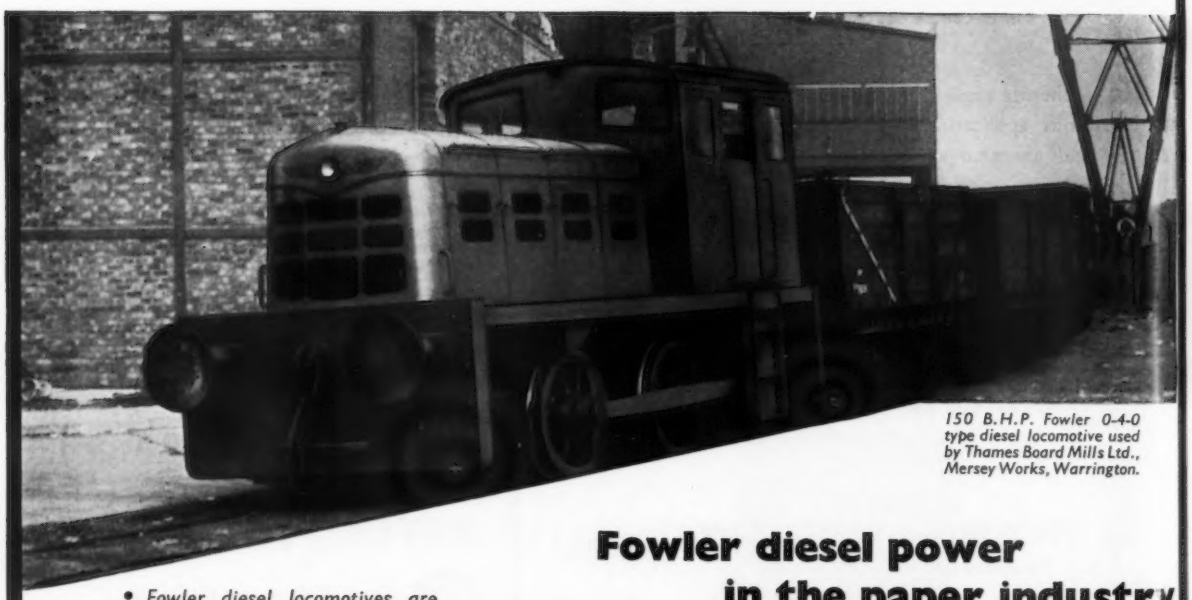

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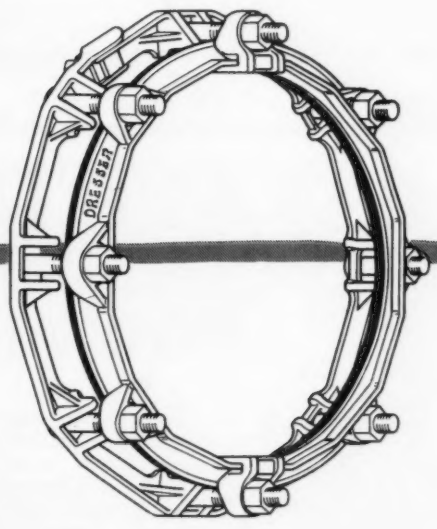

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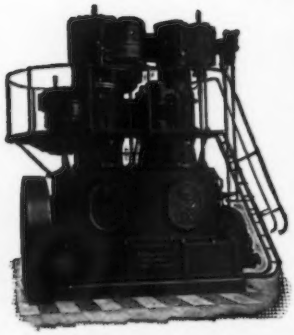

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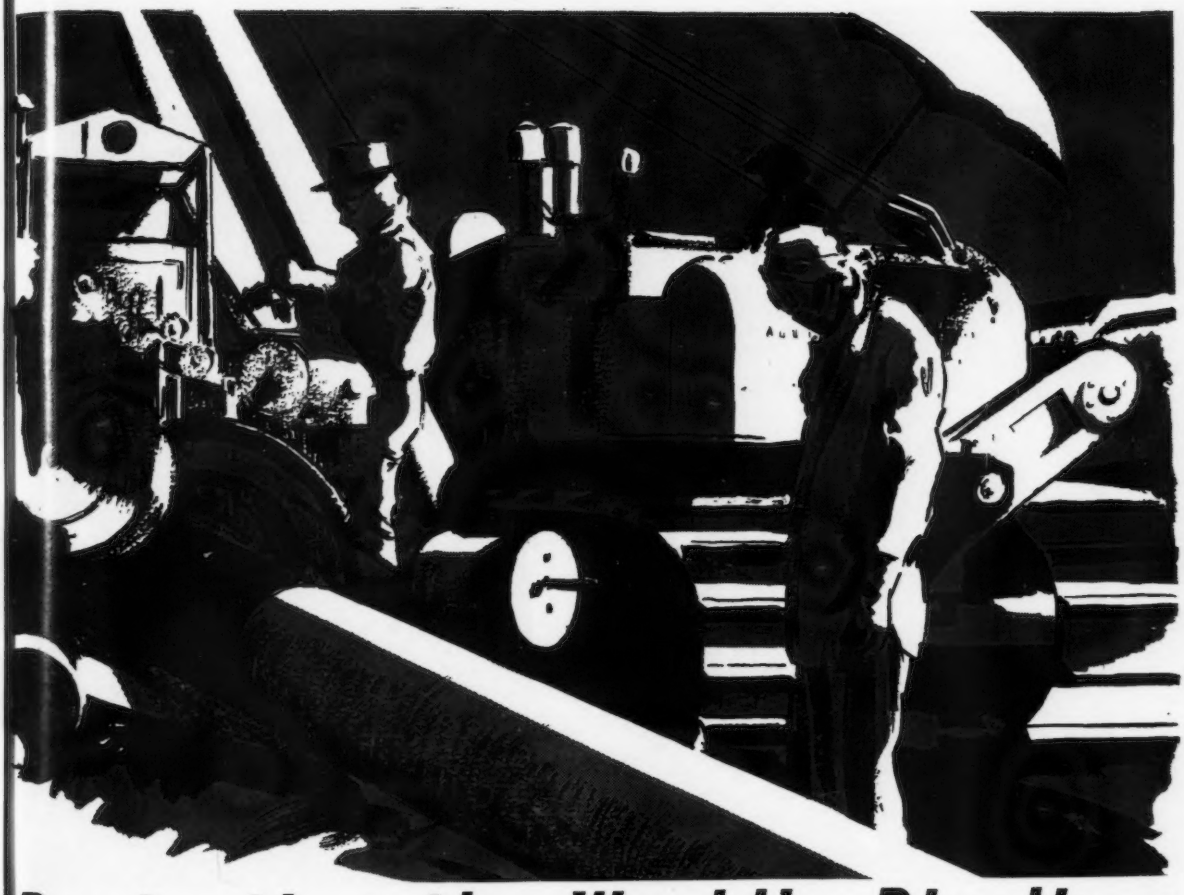

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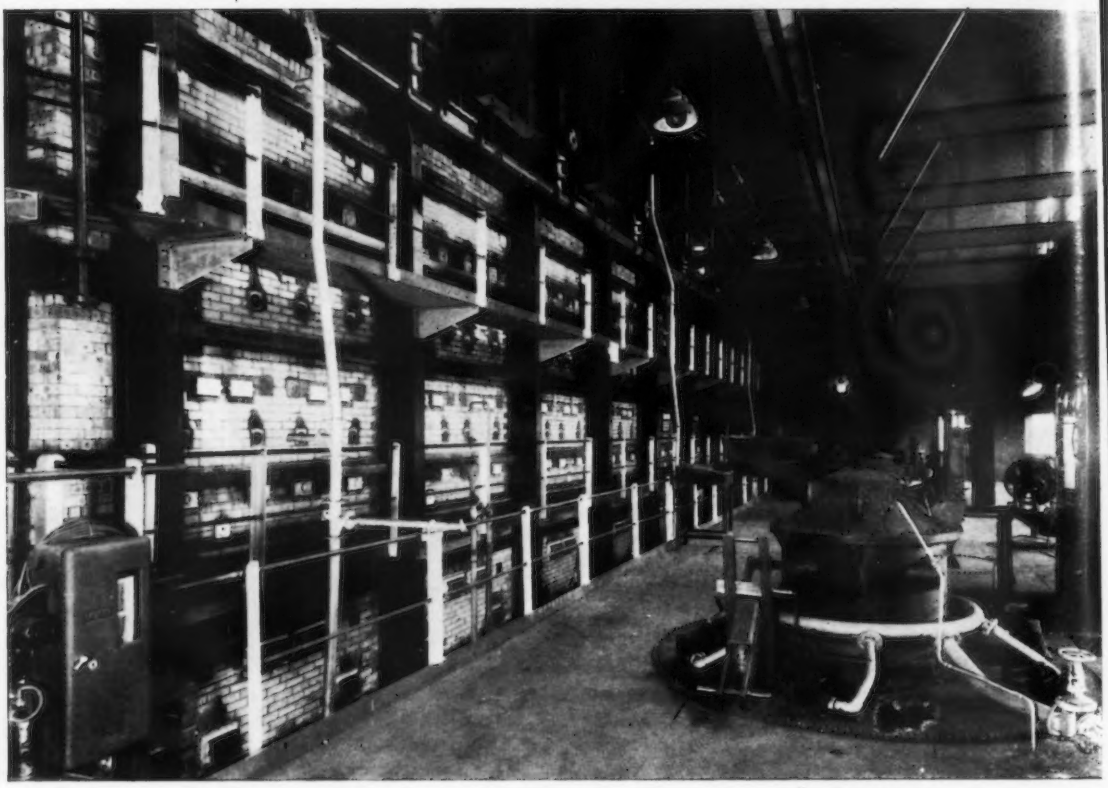

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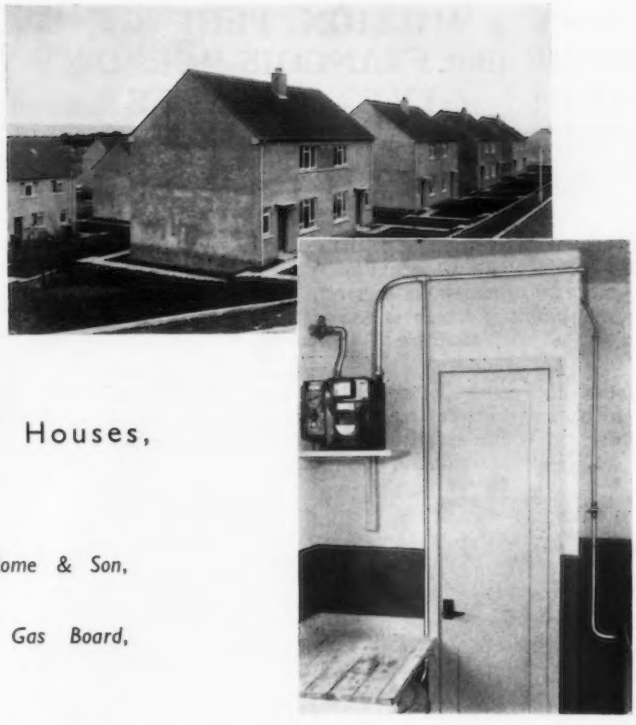

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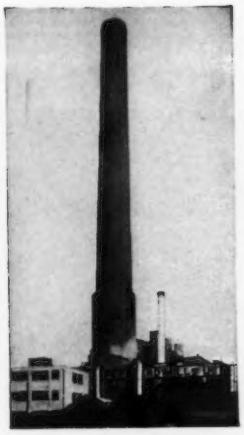

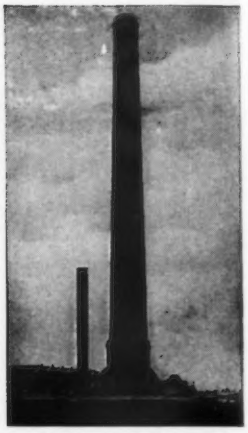

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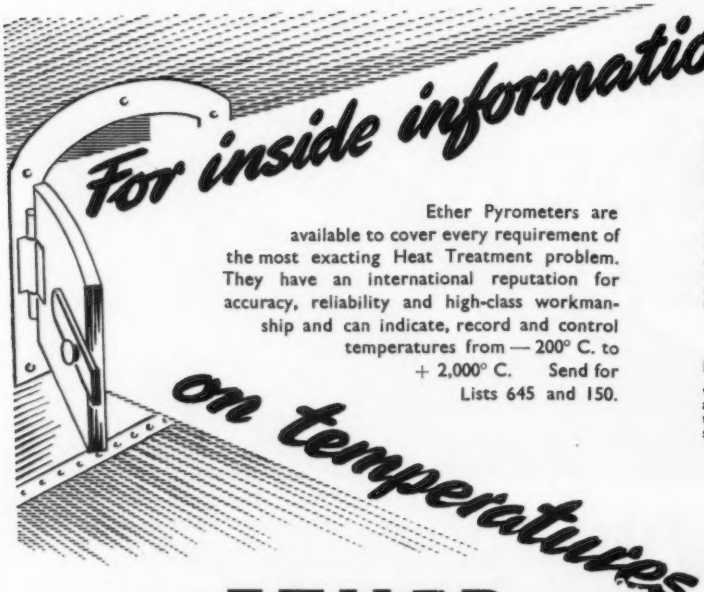

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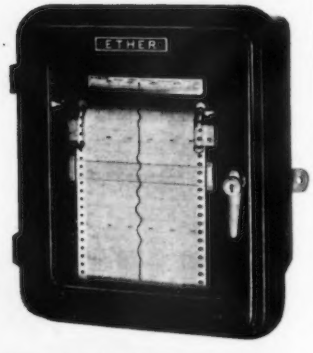

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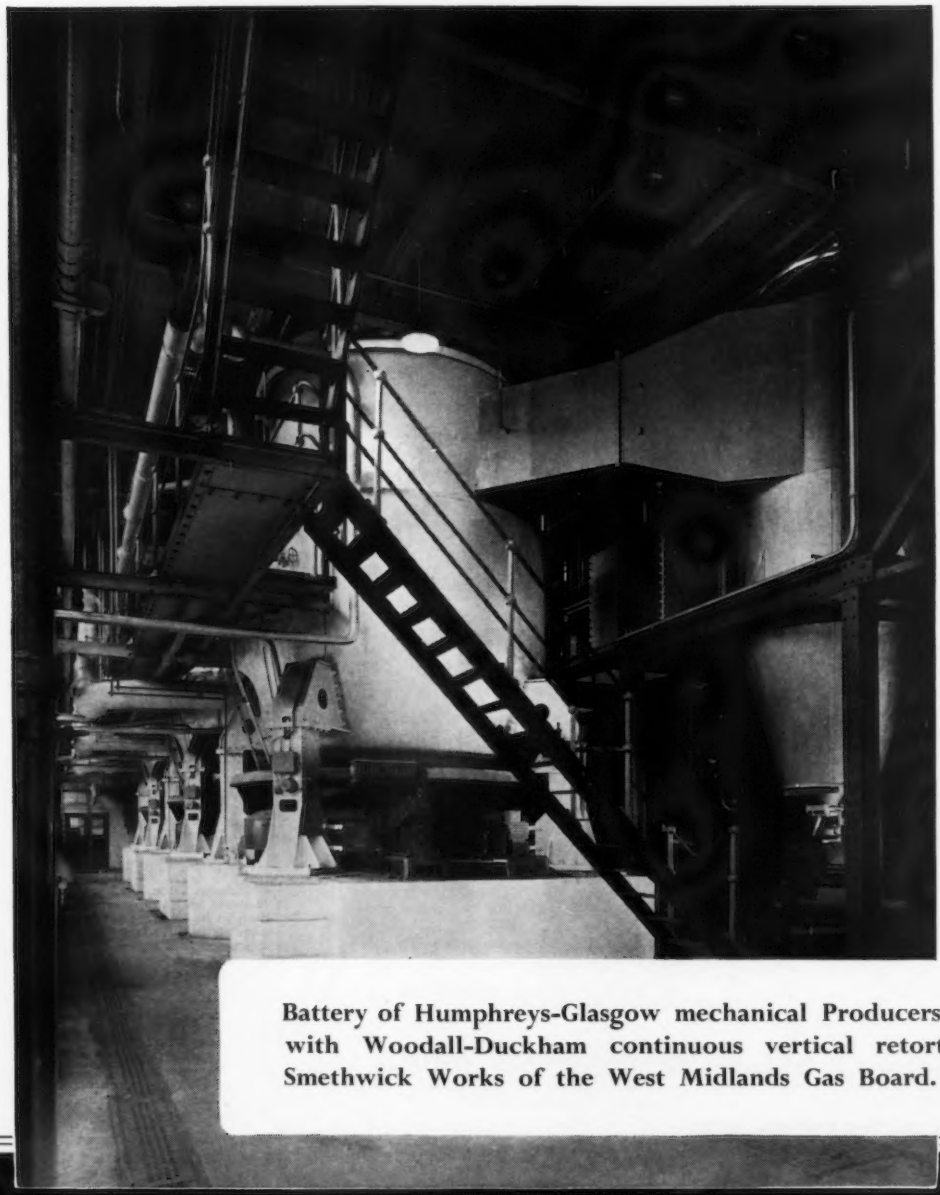

Battery of Humphreys-Glasgow mechanical Producers installed with Woodall-Duckham continuous vertical retorts at the Smethwick Works of the West Midlands Gas Board.

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Gas Journal

VOL. 284 NO. 4820 October 19, 1955

107TH YEAR

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(July-September, 1955)
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Gas Journal

VOLUME 284. No. 4820. OCTOBER 19, 1955. 107th YEAR

Six Years Under Nationalisation

STEADY progress against mounting odds has characterized the activities of the gas industry during its sixth year since nationalization. This much can be concluded from the Report and Statement of Accounts from the Gas Council and twelve area boards for the year ended March 31, 1955, which were released yesterday coincidentally with the Annual Report on Gas of the Ministry of Fuel and Power. Financial results can sometimes be misleading since the effects of variations in the price of raw materials and finished products of an industry take different times to mature. However the gas industry, as a whole, has been able to show a net surplus for the year 1954-55, after transfers to and from taxation reserves, of £2,472,553 which compares very favourably with the £2,111,536 for the previous year. Considering the violent upheavals which have taken place in price levels during the year, this would seem to be an extremely fine piece of budgeting by the executives and accountants of the industry. Of the area boards the North Western continues to show the largest surplus with £1,027,784 for this year as against £992,029 for 1953-54, while the smallest surplus is that of the Northern Gas Board which just scraped through the year with £232 'left in the kitty'. The three boards which were in the red last year, *i.e.*, the Scottish, Eastern and South Eastern are well in the clear this time with surpluses of £388,874, £160,444 and £700,657 respectively. On the other hand the West Midlands and North Thames Boards which had substantial balances for 1953-54 now show deficiencies of £104,234 and £155,568 respectively. In both cases these deficiencies are well covered by the previous year's surplus.

The year under review was one of mounting costs, not only as regards the industry's chief raw material, coal, but also in respect of wages and salaries. According to the Gas Council's figures these items were responsible for an increased outgoing of £7,165,000. Since March 31, 1955, there have been further increases which are estimated to cost the industry about £25 mill. a year. Chief among these is, of course, the swingeing increase of 12s. 6d. per ton on the price of coal which took effect from July. This alone will call for a further £17¾ mill. a year and will undoubtedly have a profound effect on the current year's acounts. Up to the end of the financial year 1954-55 six boards had managed to get by without increasing their prices, but as a result of subsequent reverses, especially the one just mentioned, they have had to come into line. Without doubt the staggering price of coal today is one of the greatest problems which face the industry, and it is small wonder that it is turning towards other possible raw materials such as oil and natural gas. Before leaving carbonization, however, it should be recorded that the average yield of gas per ton of coal during the year was 74.8 therms compared with 74.5 therms for the previous year. Few outside the industry will realize the 'blood, sweat and tears' that are required to increase by 0.3 of a therm an already very high figure.

In the report of the Ministry of Fuel and Power it is stated that the Minister has encouraged the use of oil in gas manufacture, since it can 'make a substantial contribution towards meeting the increasing base-load requirement and, as an alternative to water gas made from coke, can increase the quantity of coke for sale'. Here we touch upon one of the most difficult of the industry's problems, which is how to provide the coke needed to implement the clean air policy, while at the same time making available the large quantities of gas which continue to be demanded. The complete gasification of large quantities of oil, even for base load purposes, and the reduction of water gas manufacture from coke is the only answer. Five oil gasification plants were at work by March 31, 1955, sixteen were on order and nine more were under consideration, and it is expected that when all the plants that are on order are operating they will produce up to 32 mill. cu.ft. of gas per day, representing a saving of 364,000 tons of coal a year. From these figures it can be seen that oil gasification has already made a significant contribution to coal saving and will become more and more important as time goes by.

In its search for natural gas in Britain the Gas Council has not yet been favoured with good fortune. So far commercial quantities of this gas have not been found, but work continues on the five-year programme. It was realized that a very large strike of natural gas was unlikely in this country, but the Gas Council felt—and quite rightly—that 'having regard to the high price now paid for coal, even a modest success would be a handsome reward for the Council's expenditure'. During the year under review another exciting idea concerning natural gas supplies has been proposed; this is the possibility of importing it in a liquefied form from the

oilfields of the Middle East and elsewhere. The North Thames and South Eastern Gas Boards are investigating the possibilities. In many ways this proposition has less 'hit and miss' about it than the drillings for natural gas. On the other hand, the technical problems involved in liquefying the gas and in handling it over such great distances will need considerable time for their solution.

The position of coke has attracted, and continues to attract, the attention of the entire industry and it is interesting to note that, despite reduced quantities being made for sale in 1945-55, coke sales increased during the year from 10,597,000 tons to 11,170,000 tons. The increases were obviously met from stocks and purchases, coke stocks at the close of the year being just over 200,000 tons, the lowest since 1951. It is to be hoped that these stocks have been adequately replenished during the past summer in order that the winter of 1955-56 may not see the hopes of a cleaner atmosphere rendered sterile through shortage of coke. According to their Report, the Gas Council recognizes that much has yet to be done to make coke a popular fuel and also to ensure its technical perfection, but the Council believes that, given suitable coal, the gas industry can expand its production and sale of gas and coke on a scale sufficient to enable the smokeless fuel problem of the 'black' areas posed by the Beaver Committee to be solved within ten to fifteen years. Whether the Minister of Fuel and Power will see to it that the industry receives the coal it requires is another matter. However, the Gas Council is on record now and there should be no drawing back from its statement.

During the year further progress was made with various integration schemes, as a result of which 83 works were closed down. A characteristic of the post-war era, the gas grid has cast its influence over the whole industry and has been largely responsible for reducing the total number of gasworks in operation from over 1,000 on vesting day to 785 today. The total length of mains on March 31 was 85,991 miles, an increase of 2,577 miles during the year. Distribution techniques have acquired a number of features of particular interest recently, and among these have been the use of the 'pipeline' system of mainlaying adopted by the Wales Gas Board, and the proposed use of really high pressures (300 lb. per sq. in.) in the Eastern Area. In this respect, as in so many others, the past year has proved that the gas industry is as ready as ever to meet new situations with new methods.

Earlier on we referred to the industry's 'steady progress against mounting odds.' Among the odds with which it had to contend during 1954-55 was the continuance of 50% purchase tax on gas appliances other than cookers, water boilers and manually-operated washing machines, and the reimposition of hire-purchase restrictions on February 25, 1955. It is no mean achievement that despite purchase tax record sales of appliances were made during the year, the total value being £36,620,209. The reimposition of the hire-purchase restrictions came very late in the financial year, and its full effect will be seen more accurately in the current year's accounts. It is interesting to record that despite hire purchase, gas continues to be the choice for cooking of the vast majority of housewives. The South Eastern Gas Board reports that 89% of occupants of new dwellings, where gas was available, chose it for cooking. Obviously those who think that gas has seen its best days as far as this load is concerned had better think again!

A subject which has aroused much public concern in recent years has been the number of accidents occurring from the use of gas in the home. The post-war pattern of society is such that a considerable number of people find it necessary to live on their own, and the number includes many old and infirm folk who are more accident-prone than others. The Gas Council has, therefore, intensified its study of all aspects of safety, and a special technical sub-committee of the Watson House Centre has been appointed to consider, in collaboration with the manufacturers, further improvements in the design of appliances and safety devices; and a Safety in the Home Committee, on which all area boards are represented, has been set up to ensure that the latest and best practice is applied throughout the country. The Council came to the conclusion, however, that the question, so far as it affects elderly people, is part of the much wider social problem of the care of the aged. Through the Women's Gas Federation the Council has therefore enlisted the assistance of a number of social organizations whose workers have undertaken, when visiting elderly people living alone, to pass on to them hints on safety in the home, and particularly on safety in the use of gas. Meter readers and collectors have been asked to make a note of the addresses of elderly people living by themselves so that these addresses may be available to social workers. The industry is also increasing its efforts to encourage all consumers of gas to give their appliances the reasonable care and attention which any domestic apparatus requires to render the best service.

All these measures will contribute their quota to the protection of the elderly and the infirm. A great deal of criticism will be levelled against the industry as a result of accidents through the use of gas, and quite rightly, if harm comes to consumers through some avoidable cause. It is to the credit of the Gas Council that, in this matter, it has not chosen to turn away from unpleasant facts but has faced them with the appropriate action.

A final word on the industry's relationships with its own workers. These have continued to be very good as has been shown by the smooth way in which day-to-day operations have proceeded. Many employees of gas boards have received awards for continuous service of 25 to 50 years, and this is a sign that there is still a firm tradition of long service in the industry. Naturally, in a period of continually rising prices, there have been wage demands, but these have been settled without disturbance to the industry's efficiency, and although they will cost over £2½ mill. annually, they are part of the price of full employment.

Altogether it has been a challenging year with revolutionary ideas about gas production and supplies, and novel techniques in distribution, not to mention the vista of opportunity opened up by the Beaver Report and the subsequent Clean Air Bill. In some ways so much has happened that it is difficult to 'see the wood for trees.' One thing, however, is certain. So long as the industry, in the words of the Report, 'welcomes the challenge and opportunity involved' in meeting the demands for its products it will continue to make steady progress, whatever the odds!

6th International Gas Conference

Mr. C. A. King, Managing Director of the 'GAS JOURNAL,' who was a member of the British party attending the conference continues his report on the visits and social events. Mrs. King, who accompanied the 'M.D.' on the trip, concludes the report with some notes on the special arrangements made for the ladies.

IT is estimated that between 11 a.m. on October 1 and mid-day on Sunday, October 2, some 20 sq.ft. of photographic emulsion was exposed to the actinic rays of the Niagara Falls and some 24 ft.-lb. of energy expended by the British contingent in assuming and discarding the garb of a deep-sea fisherman. The latter operation was dictated by the urge to view the falls from the inside as well as in the rational manner, and to look up at the Horseshoe from the deck of 'Maid of the Mist' chugging about in the whirling maelstrom below.

Laid on by what our friends over here might call 'the energetic and ever-vigilant Secretary Braunholtz' was a coach tour of the beautiful countryside surrounding Canadian Niagara, with a walk along the Rapids, a view of the Sir Adam Beck Floral Clock at the Hydro Station (what relationship to the founding of Beckton?), and a pause to gaze down upon the Whirlpool over which seven or eight more intrepid souls ventured in cable car.

Then there was the treat of dining in the Rainbow Room of the Sheraton Brock—tenth-floor dining room which looks out over the Falls floodlit in an ever-changing spectrum of subdued colour. Glancing for a moment at the gastronomic front, it is worthy of record that small communities in Canada suffer from a drought, partial on weekdays and complete on Sundays. This does much to increase the income of United States Internal Revenue, through tolls payable on the Rainbow Bridge; but it is ill-spent, for American Niagara has little to commend it and the gin is horrid. So, anyway, it seemed to a rather debased couple who made the crossing, but who were rewarded by meeting successively a U.S. Customs Officer who was stationed in Colchester during the war and a Canadian official who hailed from Lowestoft. The latter's son is a leading surgeon in Canada. It is a country of enormous promise.

Cleveland, Ohio

So by rail car to Buffalo and express train to Cleveland, on Lake Erie, where H. E. Eckes, Public Relations Officer to the East Ohio Gas Company had prepared a welcome fit for Royalty—porters and a fleet of taxis laid on and every detail of arrangement lifted from the rather weary shoulders of the travellers.

Cleveland is described as the heart of the great North American market; its diverse industries producing about two-thirds of all 'classified' products in the States. Of the nation's total manufacturers, nearly 93% lie within the 500 mile radius of the city. A great industrial boom is expected to follow the opening, in the near future, of the St. Lawrence Seaway. The Mayor in his letter of welcome (such letters were a feature of every hand-out) described Cleveland as 'one of the great melting pots of the country.' There were 2,000 organizations representing 46 nationalities—a 'United Nations' in theory and practice.

Tuesday was devoted to a visit to the immaculate and well-endowed laboratories of the American Gas Association and 'East Ohio's' plant, particularly the meter shop and the training centre. A brief account of their activities is given in a later page of this issue (p. 209). Arrangements for the former visit were novel, interesting and highly efficient. First, a talk by the Director, Edwin H. Hall, who briefly described the set-up and finances of the laboratories, and a welcome by W. G. Rogers, President of East Ohio Gas; then a tour in small groups of the lavishly labelled plant; a picnic box lunch in a conference room; and finally a 'Q. and A.' Session where numerous telling points were raised.

The day closed with a drive through the gardens and parklands and 'Dollar Princess' residences of a fine city; evening brought first-class entertainment in the form of an 'international' dinner given by the Gas Company at the Alpine Village Restaurant. Nothing there but what was for our pleasure, including souvenir photographs which (for purely aesthetic reasons) will not be reproduced in our pages.

By now the call of regular duty was thinning the British ranks, and it was but a score—and a fairly weary score—who entrained at midnight in the Chicago sleeper.

Chicago, Illinois

Here the hosts were The Peoples Gas Light and Coke Company and the Institute of Gas Technology; here again a full but well co-ordinated programme of instruction and pleasure, extending over two days. The first contained a visit to the Institute, where a welcome was extended by the Director, E. S. Pettyjohn, who reminded us that the Institute had been founded in 1941 by 'forward-looking executives' for education and research particularly applying to chemical and mechanical engineering. Apart from internal study, they run home study courses, and there is a highly successful three-weeks' summer school in natural gas technology.

The Institute is maintained by contributions, on a 10-year agreement basis, amounting to 0.1% of the net profits of interested gas companies and manufacturers, and by the donations of 7% of the income of the two revenue receiving committees of the A.G.A. Total income is equivalent to something over £20,000 per annum. For the building itself about £150,000 was subscribed and the Illinois Institute of Technology granted a 99-year lease at a 'peppercorn' rent.

After an excellent refrectory lunch at the Illinois Institute, many of the party went on to the Crawford Station to see the synthesis substitute gas production unit.

In the evening Lucullan entertainment by the Peoples Gas Light Company, but for the writer of this diary a regretful farewell to the group. With him left the last of the ladies who had embarked at Southampton just three weeks ago and who now takes up her pen to describe their special treats.

'The Ladies'—by One of Them

Looking back on the activities specially provided for the ladies accompanying the delegates on this memorable trip to the U.S.A., the first impression is one of generous hospitality and warmth of welcome. Our first experience of this was an orchid in Philadelphia and an invitation by the Ladies' Committee to look around the outskirts of the City the next morning. After the informal cocktail party and dinner of the night before this gave us a chance to meet our hostesses, and we were all grateful to them for giving us the opportunity to see just what the ordinary tourist does not see—lovely, gracious homes set in beautiful surroundings. In my own case this included a visit to a housewife's paradise—Penns Stores—where one has only to pick up the goods and put them into a large carrier on wheels, which incidentally will also carry the baby! At the end of the tour of shopping the cost is added up, the goods are wheeled out for you (the doors open automatically) and put in your car. That day we were entertained to lunch at the Country Club, situated in ideal surroundings.

In New York City we were given the use of a ladies' drawing room which proved to be a great meeting place, where coffee and cakes were always to be had. Ladies of the Committee were regularly there to give us any advice and help, and certainly it was one's own fault if one was not in the right place at the right moment. Very wisely nothing was arranged for the mornings so that we had plenty of opportunity to look around the shops and do some sight-seeing, but the afternoons were organized so that we might 'go places.' On Tuesday we were taken on a tour of Upper Manhattan to see 'The Cloisters,' a beautiful church 'retreat' overlooking the Hudson River; then back to tea at the Plaza Hotel. On Wednesday, lunch at the famous Waldorf Astoria Hotel with a dress show thrown in. The other afternoons were filled in by joining the men on the boat trip around Manhattan and lunch and a tour of the United Nations Building. Delightful cocktail

(*Continued on p.* 209.)

Personal Notes

MR. STANLEY J. SADLER, General Manager of the Solihull district of the West Midlands Gas Board, is retiring after 34 years in the town.

MR. C. T. C. WOODALL will be joining Radiation Group Sales, Ltd., on November 1. He will be Public Relations Officer for the Gas Division at Stratford Place, W.1.

MR. R. J. AYRES, C.B., C.B.E., has been appointed by the Minister of Fuel and Power, with the approval of the Prime Minister, Deputy Secretary in succession to SIR LAURENCE WATKINSON, K.B.E., C.B., M.C., who is retiring from the Public Service on November 1 next; and MR. E. J. MEADON to be Accountant General in succession to Mr. Ayres.

MR. EDWARD BRENNAN, one of the oldest employees at the Sunderland Unit of the Northern Gas Board, mains foreman, has retired at the age of 73 after 48 years in the gas industry at Sunderland. To mark his retirement he was presented on September 30 with a wristwatch and a case of tobacco pipes by MR. W. WILLIAMSON, Engineer to the Sunderland Division.

MR. E. L. BLACK, Chief Technical Assistant of the Scottish Gas Board at Dumbarton, has been appointed Assistant Engineer and Manager of the Kidderminster Group. Mr. Black, who was previously Assistant Engineer and Manager, Vale of Leven, and who received his earlier training at Motherwell Gas Undertaking, commences his new duties on November 1, 1955. His post as Chief Technical Assistant will be filled by MR. A. M. JACKSON, Works Superintendent at Helensburgh. Mr. Jackson, who received his early training at Falkirk, came from Cambridge to Helensburgh a year ago.

MR. JAMES HENDRY, Distribution Superintendent to the Fife Group of the Scottish Gas Board at Dunfermline for the last four years, has been appointed Manager of the Dunoon District of the Board. Mr. Hendry entered the gas industry as an apprentice engineer with the Paisley Corporation gas undertaking in 1939. In 1941 he joined the Royal Air Force and served until his demobilization in 1946, when he returned to the employment of the Paisley Corporation. After nationalisation of the gas industry in 1948 he was promoted chief technical assistant at the Paisley gasworks. Two years later he was transferred to Dunfermline gasworks as chief technical assistant, and in 1951 was promoted to Fife Group distribution superintendent. He is an Associate Member of the Institution of Gas Engineers.

Obituary

MR. W. PHILLIPS has died at the age of 66 after he had completed 50 years' unbroken service in the gas industry in April last year. He was first with the Salisbury Gas Company and latterly with the Southern Gas Board. To mark this occasion he was received by the members of the board at a presentation ceremony at the headquarters in Southampton. Mr. Phillips started work in 1904 as a district fitter's mate at seven shillings per week. After ten years on the district he transferred to the works on the outbreak of the first world war, where he remained serving in various capacities as C.W.G. plant operator, telpher driver, and for the last twenty years or so as charging machine driver. He continued work until last December when ill-health overtook him, and he finally retired in April.

Diary

October 19.—LONDON AND COUNTIES COKE SALES CIRCLE: Visit to Beckton gasworks.

October 19.—SOUTH WESTERN SECTION, I.G.E.: Annual General Meeting, Swindon.

October 25.—EASTERN G.C.C.: Connaught Rooms, Great Queen Street, W.C.2, 11 a.m.

October 27.—MIDLAND JUNIORS: Day visit to Meters, Ltd., Manchester.

November 4.—SCOTTISH JUNIORS (WESTERN): 'The Accountant in the Gas Industry.' Gas Showrooms, 522, Sauchiehall Street, Glasgow, C.2. 6 p.m.

November 5.—SCOTTISH JUNIORS (EASTERN): Visit to Scottish Tar Distillers, Falkirk.

November 8.—MIDLAND JUNIORS: Paper, 'Mechanical Handling,' H. S. Smith, Birmingham.

November 9.—INSTITUTE OF FUEL, LONDON: 'Chimneys and the Dispersal of Smoke,' J. E. Hawkins and G. Nonhebel, Institution of Civil Engineers, Great George Street, S.W.1. 5 p.m.

November 10. — EASTERN JUNIORS: Address by L. W. Andrew; followed by a tour of Watson House Laboratories, London.

November 16.—EASTERN GAS BOARD.—Cambridge Salesmen's Circle. Reports from delegates who attended the Sales and Service Conference.

November 16.—INCORPORATED PLANT ENGINEERS, Kent branch: 'Refrigeration and its Applications,' B. F. Brown. Bull Hotel, Rochester, 7 p.m.

November 17.—MIDLAND JUNIORS: Half day visit to Nechells 'B' power station.

November 21. — WEST MIDLANDS G.C.C.: Committee Room, Gas Offices, Edmund Street, Birmingham, 3, 2.30 p.m.

Future Coal Requirements

If the National Coal Board was to reach its target of 250,000,000 tons of deep-mined coal a year, there would have to be 'a lot of pulling up of socks,' D. G. E. Foxwell told a joint meeting at Stoke-on-Trent of the North Staffordshire Fuel Society and the Midland section of the Institute of Fuel. Were coal production to reach a continued output of 250,000,000 tons a year, we could meet our energy requirements over the next 25 years by judicious selection of coal, oil, and atomic energy, he said.

The long-term supply position of coking coal was disquieting and the iron and steel and gas industries would have to make every effort to use lower grade coal. The immediate problem of providing for the manufacture of domestic coke to meet the requirements of the Clean Air Bill was less difficult. Enough of the large coal displaced from domestic fires by smokeless fuel and from the railways by electrification would be of the carbonizable types to meet requirements.

NEWS IN BRIEF

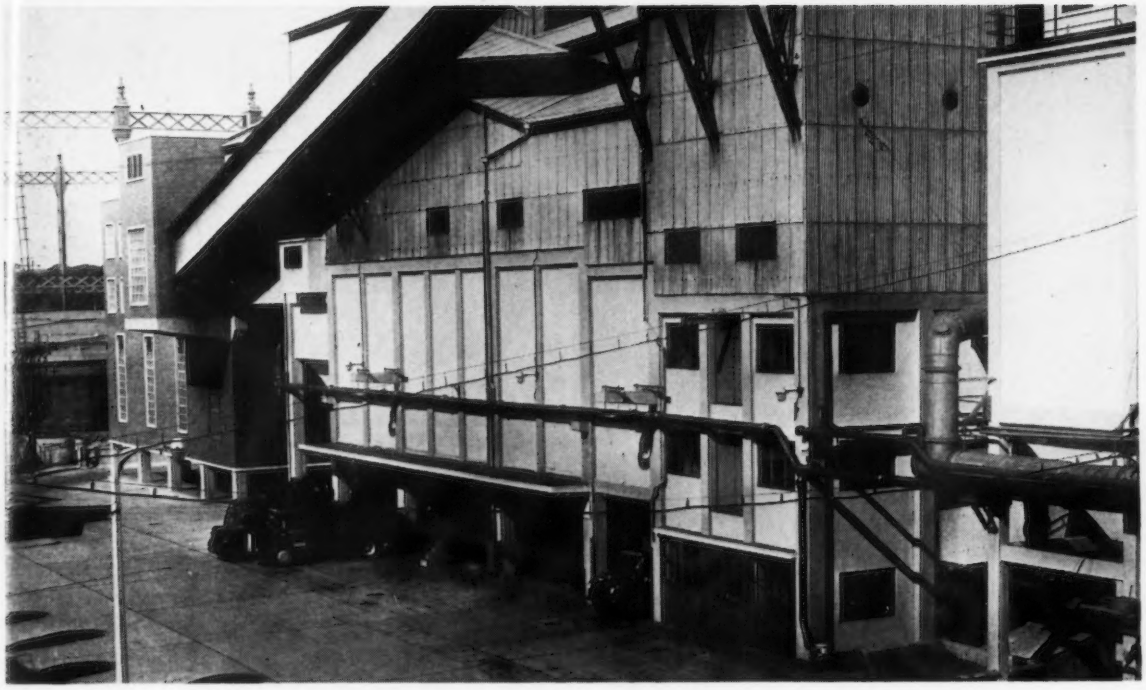
From August 31 till September 28 the amount of gas manufactured in Coleraine (Co. Londonderry) Borough Council's gas undertaking was 14,051,100 cu.ft., an increase of 291,700 cu.ft. compared with the corresponding period last year.

Belfast Corporation Gas Committee have been considering the question of the use of oil for the manufacture of gas, and have been told by the Engineer and Manager, Mr. G. Hyslop, that none of the processes for oil gasification so far available offer any economic advantages to the Department at the present time.

With the recent increases in the price of coal and the steady rise in the cost of maintaining plant and equipment resulting in the price of coal gas becoming prohibitive, Magherafelt (Co. Londonderry) gasworks have ceased to produce coal gas, thus ending over a century of service for this type of gas.

The L.C.C. Brixton School of Building in collaboration with the Ministry of Works has arranged two public discussions on matters of interest to the building industry. The first was held on October 18; the second, at the Building Exhibition, Olympia, will be held at 6 p.m., on November 22. Applications for admittance, which is free, should be made to the Technical Information Officer, Ministry of Works, Lambeth Bridge House, S.E.1.

At a Birmingham inquest on October 5 last, a verdict of "accidental death" was recorded on Mrs. Lily Keilty, aged 74, of 214, Westminster Road, Handsworth, who collapsed and died when a gas meter sprung a leak. Mr. F. Fleming, a gas official who inspected the meter after the accident, said it had been installed in 1912 and was last repaired in 1934. He had known one which was installed in 1850, but had never heard of one leaking from a seam before.



Sack loading debreezed and graded coke from hoppers at Kensal Green works.

Coke Handling at Kensal Green

The importance of efficiency in the handling and grading of coke is paramount today. In this exclusive report we describe the modern methods in use at the Kensal Green works of the North Thames Gas Board

IT is probable that more residential consumers in North West London are supplied with coke from the Kensal Green works of the North Thames Gas Board than from any other in the area. The demand of coal and coke merchants (who also deal mainly with domestic consumers) is also met in North West London by Kensal Green.

This post-war domestic trade boom has called for a modern loading system capable of dealing with an ever-increasing road transport volume. At the same time, although the existing facilities for loading rail trucks have been kept, local demands have cut the quantities of coke sent away by rail.

Kensal Green has two Woodall Duckham continuous vertical retort houses. 'No. 2' was built in 1941 and 'No. 3' in 1953. Coke handling arrangements for the two houses are in principle similar, although the more modern design of No. 3 house, of course, means improved working conditions. Annual production is about 150,000 tons of coke plus 35,000 tons of breeze.

Grading plants and reinforced concrete storage hoppers are built into the retort houses, coke being either sack-loaded into lorries immediately below the hoppers or alternatively taken to the coke storage ground by belt conveyors. The coke is discharged cold—after cooling by water sprays in the retort coke boxes.

The 'GAS JOURNAL' was able to experience the comfortable operating conditions during the extraction periods—largely due to the Drummond dust extraction plants installed in both retort houses. Both grading plants are interchangeable; coke from No. 2 retort house can be sent to No. 3's grading plant if required and *vice versa*.

No. 3 Retort House

Every two hours coke is drawn from the retorts. A series of seven rubber belt conveyors carries it to a mild steel buffer hopper, lined with blue brick, of 10 tons capacity.

The grading plant consists of a scalping screen of 2½ in. by 2½ in. mesh and a Gyrex double-decker screen of 1¼ in. by 1¼ in. and ¾ in. by ½ in. meshes.

Large coke leaves the scalping screen via a cast-iron lined chute leading to a rubber belt conveyor. This takes the material to the storage hopper. A two-way flap enables coke to be sent to the producer hopper when required. Capacity of the storage hopper is 30 tons and of the producer hopper 45 tons.

Broken coke leaves the Gyrex screen via a cast-iron lined chute. A belt conveyor then takes it to either a surge hopper serving the Birtley dry cleaning plant or to another chute and belt for the storage hopper, which has a capacity of approximately 50 tons.

Boiler nuts leave the lower deck of the Gyrex screen, after which the system of handling is symmetrical with the 'broken' system. The nuts are removed from the surge hopper by a belt conveyor and then enter the dry cleaning plant. A further series of belts convey the cleaned nuts to the storage hopper, which has a capacity of about 45 tons.

Two Birtley pneumatic separators, each of 10 tons per hour capacity, are installed for treating broken coke and boiler nuts. The tables, employing embossed deck plates without riffles, are each provided with a forced draught fan and air control, and are connected to a common exhaust duct taking the dirty air to the Rotoclone washers.

No. 2 Retort House

Extractions from the coke boxes in No. 2 house also occur at intervals of two

A scalping screen in the coke grading plant.

Coke discharging on to a belt conveyor.

hours. The method of conveying coke to the grading plant is similar, the only difference being that there are six belts used instead of seven. The capacity of the mild steel, blue-brick-lined buffer hopper is 10 tons. Here again we describe the methods of dealing with different grades:—

Large Coke

This grade is sub-divided into 3 in. by 2 in. and 'oversize,' both divisions being fed to the 3 in. by 2 in. screen from the scalping screen and from there direct to their respective hoppers. Both hoppers hold 50 tons each. Coke for producers is taken from storage hoppers and elevated by belts to the 45-ton capacity producer hopper.

Broken Coke

From the top deck of the Gyrex double-decker screen the broken coke goes from an inclined chute on to a further series of belt conveyors to the storage hopper holding 75 tons. Broken coke is used for filling retorts that have been off for scurfing, and is elevated by belts to the scurfing hopper.

Boiler Nuts

After leaving the lower deck of the Gyrex screen a similar system is used for boiler nuts as for broken coke to convey the nuts to the storage hopper. The breeze falls direct into a separate breeze storage hopper.

Coke Loading from Retort Houses

In the 'sack trade' the coke is discharged from the hoppers through chutes over 2 ft. A.C.E. debreezing screens of ¼ in. mesh into Belle Isle weighing machines, the breeze being returned by a conveyor belt and bucket elevator to the breeze storage hopper. This system is common to both retort houses.

Bulk sale of coke from the Kensal Green retort houses is very simple and efficient. In both plants a conveyor belt system sends the coke to run through the outlet of the storage hopper on to a lorry-loading belt.

Coke stocking frame with conveyor boom at Kensal Green works.

Breeze, too, is discharged by this method for trade to barges, lorries unloading the breeze at the side of the dock adjacent to No. 2 retort house. A crane then deposits the breeze into the barges which transport it down the Grand Union Canal. Breeze to the Babcock & Wilcox boiler house is sent by lorry to a skip hoist boot for elevation to the hoppers.

Loading platforms on both coke plants are constructed to be flush with the tailboards of the lorries. The loaded sacks are at the correct height for a loader to carry away without lifting from a lower level. A gang of three men, who do this job on piecework, can load approximately 18 tons of coke in an hour.

During the winter five gangs are employed, most of the men being very experienced in the work. One man in each gang is employed regularly on the scales. Another is detailed to clear and check all the scales each day, and the scale makers' representatives attend for maintenance every three weeks.

Weighing accuracy at Kensal Green is considered to be of a high standard. Surprise check weighing of sacks at irregular intervals endorses this.

Unscreened coke, 'run of retort' or coke in need of regrading, can be discharged down a boot and sent to either coke plant to go through the normal belt systems.

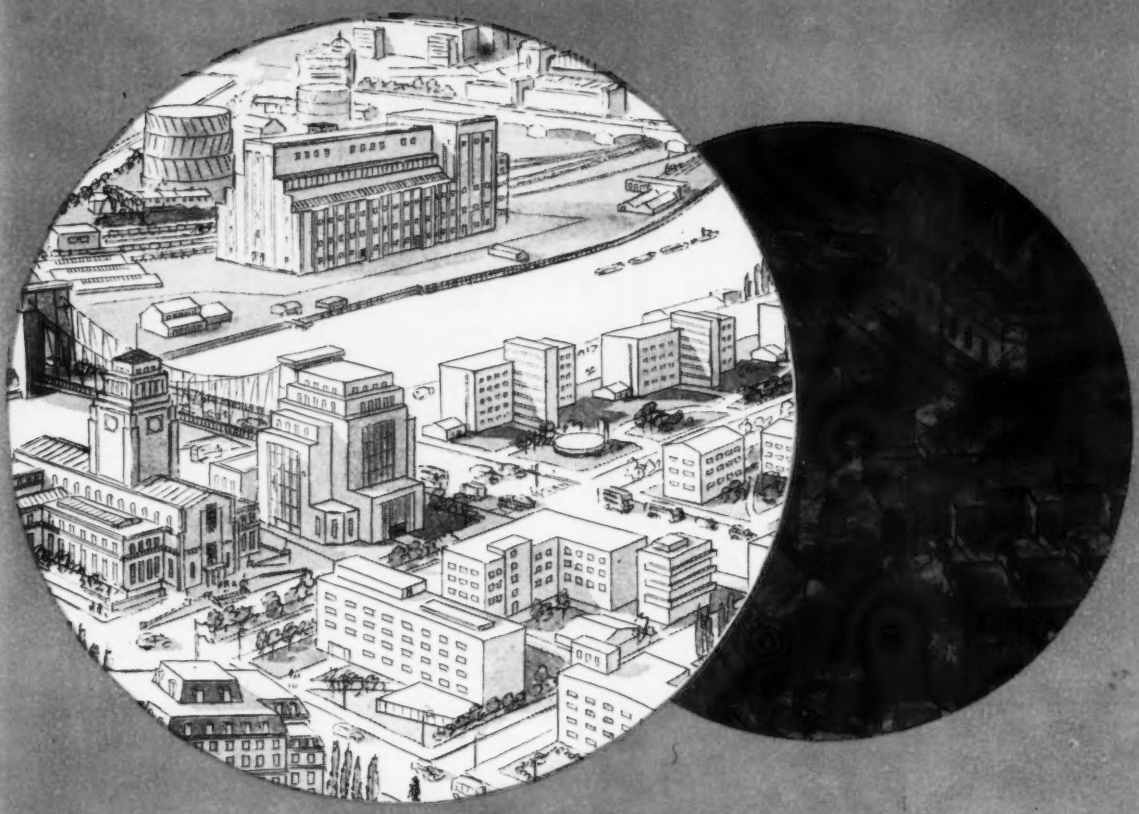
Coke for C.W.G.

The carburetted water gas plant consists of six hand-operated sets, with coke hoppers running the full length of the plant, each set having its own hopper.

Large coke is bulk loaded in the usual way and unloaded at a storage heap nearby. A mobile Bray shovel is used to send it to the hopper of a conveyor feeding a coke strip, which is elevated in a lift worked by a hydraulic accumulator. The skip tips coke into a hopper at storage level, from which it is conveyed by drag bar scraper over debreezing finger grids into the storage hoppers.

Stocking

At the west end of the works there is a 2½-acre concrete-based storage ground.



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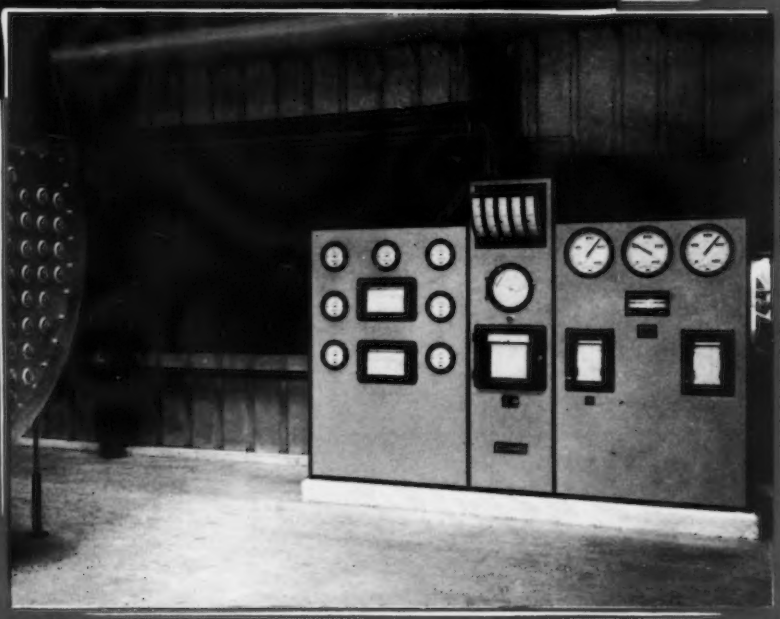

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Photograph by courtesy of Eastern Gas Board

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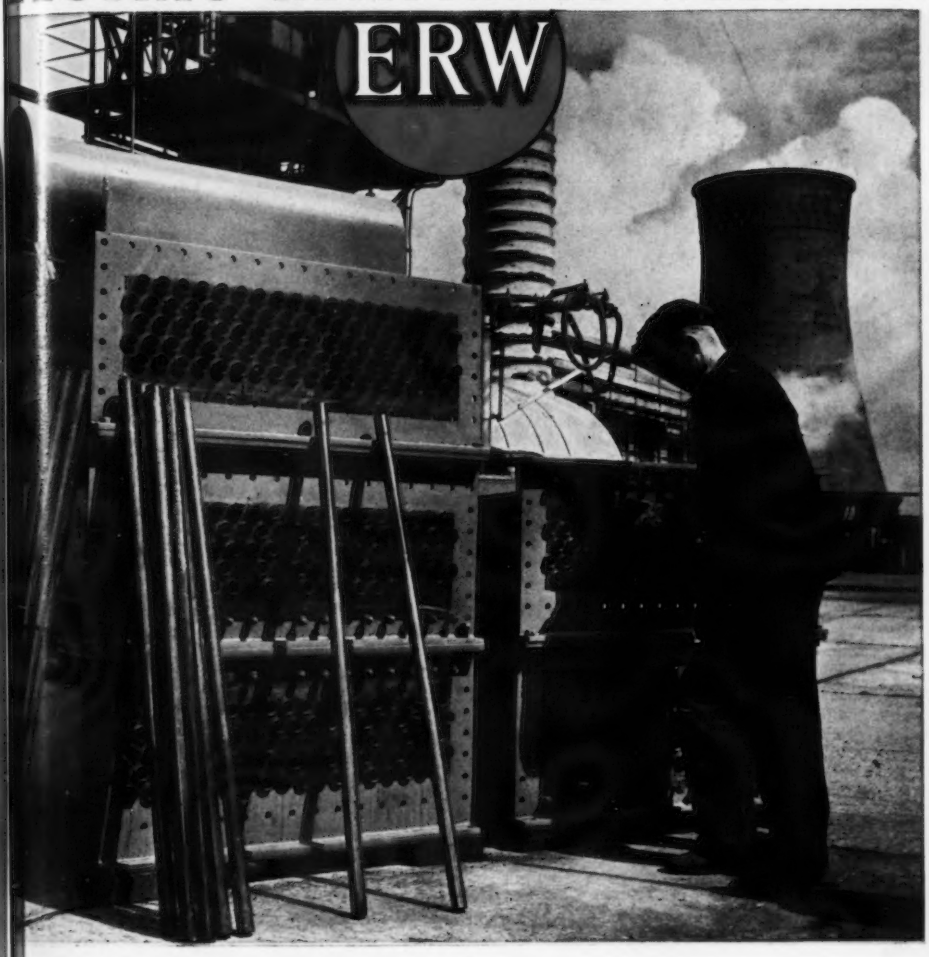

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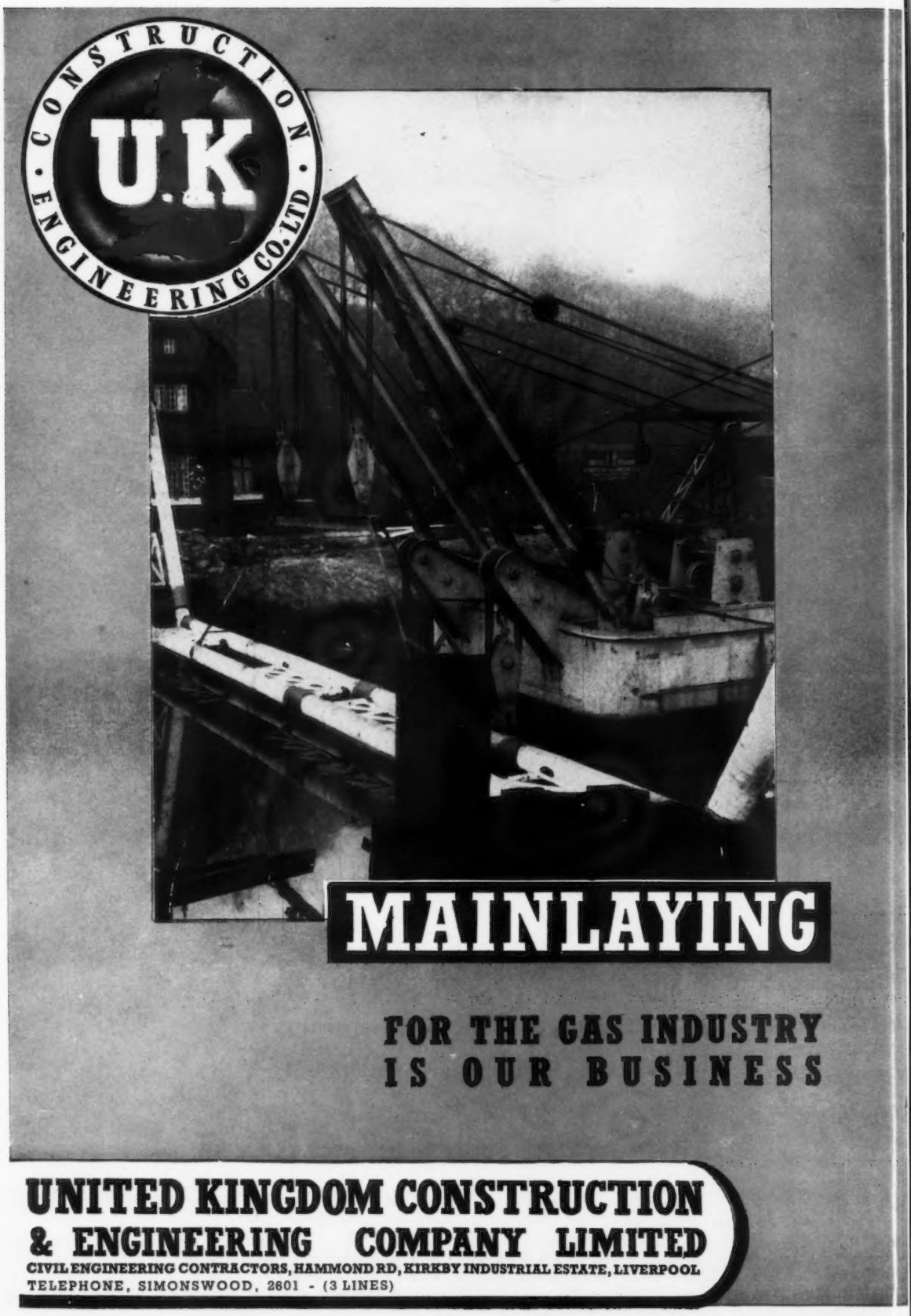
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A crane deposits breeze into barges which transport it down the Grand Union Canal.

Any grade of coke can be run from the outlet of the storage hoppers by means of a series of four belts to a coke stocking machine 68 ft. high, running on a rail track. A belt conveyor inside the machine receives coke from the last belt in the series, and this in turn passes coke to a belt on the coke stocking machine boom. The machine can stock surplus coke from the retort houses in graded stacks, or it can load railway wagons by lowering the jib of the stacker to feed coke into a fixed incline chute. The jib is capable of luffing to minimize the fall on to the storage heaps.

A Denison belt weigher installed midway on the conveyor system gives an accurate figure of coke sent to the stocking round, which has a total storage capacity of 16,000 tons.

Loading from Stocking Ground

Two Harmer loads, both with diesel engines, are available for sack loading from the stocking ground to delivery lorries.

No. 1 loader, on caterpillar tracks, has a shovel capacity of 13 cwt. The shovel feeds coke via a hopper to twin loading points, the material passing over 2 ft. A.C.E. petrol engine-driven debreezing screens with ¾ in. apertures. It then goes into Belle Isle weighers from which the sacks are filled.

No. 2 loader, on pneumatic tyres, works on the same principle but is of smaller capacity, one loading point only being provided. Breeze is removed through a chute and taken to the nearest breeze dump. With three sack loading points working the two machines are able to load approximately 45 tons per hour.

Bulk loading is performed by means of two cranes (these are also used for stocking purposes). A five-ton Stothert and Pitt caterpillar grabbing crane with grab capacities of 15 and 30 cwt. delivers coke through a portable debreezer to two portable conveyors into lorries. A Priestman crane with a grab capacity of 10 cwt. is used in the same way.

Debreezing and sackloading coke from stock at Kensal Green works.

Guilty Chimneys

On October 22 at 10.30 p.m., the B.B.C. Television will be showing the film "Guilty Chimneys", one of the most dramatic films made by the Gas Council. The film spotlights the effect of 'smog' on the nation—impairing health, ruining crops, damaging buildings—at an annual cost estimated at £250,000,000. The main cause of smoke pollution is simply the misuse of coal.

The film, which runs for 22 minutes, and will be seen by an audience of some 8 million viewers on Saturday night, indicates the steps that can be taken to overcome the problem of air pollution. It is being televised at an appropriate time—already Britain has seen the first of its fogs; and more and more local authorities are endeavouring to create smokeless zones.

6th INTERNATIONAL GAS CONFERENCE PAPER

Life of Refractories in Carbonizing Plant

By Dr. A. E. Haffner (*Great Britain*)

THERE has always been an endeavour to improve the service life of refractories in carbonizing plant, and over the last thirty years the life has been approximately doubled. Recent years have seen an increased interest in retort life. There has been a stronger reluctance to have plant idle for resetting or reconstruction because of the shortage of carbonizing plant after the war, and the slowness and costliness of its replacement.

The rising capital costs of carbonizing plant encourage a policy of high output and base load operation, leaving seasonal and peak loads to gasification plants of lower capital costs. To have resetting occurring during winter demand has always been unacceptable and it is now undesirable to have carbonizing plant out of action even in summer. Concentration of gas production in larger works connected by gas grids reduces the need for flexibility in coal gas production. These circumstances mean that the drawbacks of short service life are no longer partially offset by seasonal gas demand.

The rising costs and reduced availability of gasmaking coals have also emphasized the need for structural stability and durability of refractories in order to preserve a gas-tight retort capable of producing high outputs at high efficiency for a maximum period.

The purpose of this paper is to review the progress which has been made in service life in Great Britain and to concentrate attention on those factors which have contributed to improvements and those which have made progress slower. The paper is not directly concerned with the specialized field of the scientific study of the structure of refractories.

The structure of the gas industry has been changing rapidly during the last few years. On nationalisation there were 1,037 works and by 1954 these had been reduced to 868. The available daily capacity has continued to increase, now standing at 2,418.3 mill. cu.ft. The proportion of the different sorts of carbonizing plant over the last three years illustrates the reduction in the number of horizontal retort installations due to the shutting down of the smallest works, the continued expansion of the number of continuous vertical retort installations which still dominate the British gas industry, a relatively high rate of expansion of the numbers of intermittent vertical chambers presumably due to their greater tolerance of a wide range of coals, and an increase in coke oven capacity as the largest works adopt them in preference to horizontal retorts.

The refractories supplied to the carbonizing industry, including the coke oven industry, amount to about 200,000 tons per annum. In their construction, horizontal retorts need an initial tonnage of refractories of 13 tons per ton of coal per day: continuous vertical retorts need about 6 tons and coke ovens need 9 tons. On this basis there would be about 1.3 mill. tons of refractories installed in the carbonizing plant of both industries. If an estimated allowance of 10% is made for the refractories used in water gas plants, it can be calculated that the average rate of replacement of the carbonizing plant is 1,300,000/180,000 or 7 years. This broad picture can be the starting point of a closer enquiry.

Choice of Policy in Resetting

The life of a setting is, in almost every case, determined by the condition of the refractories and particularly of the retort material. The selection of the operating conditions of temperature, calorific value, coal throughput and the decision about the extent of hot repairs have a decisive effect upon the expectation of life of the setting, as measured by the period between resetting of the retorts. It is not always possible to fix the resetting programme so as to coincide with an appropriate degree of deterioration in the refractories and to be certain of meeting future gas demands; resetting may sometimes be carried out needlessly early. Resetting carried out between working sets is unfavourable to good workmanship and unstressed settings, and it is advantageous to shut down even two benches if they share common ancillary plant. Integration of gasworks leads to some advantage in being able to shut down larger units at the most appropriate time. The additional length of life of refractories which is being generally experienced is very welcome in the gas industry.

Formerly, it was possible for resetting or rebuilding to be confined within the summer trough of seasonal gas demand. The discrepancy between the gas demand and coal gas production was covered by diluent gas or carburetted water gas. The circumstances were ideal, for it was possible to carry out the resetting in nine months and there was no need to have extra carbonizing plant available to cover production lost by resetting.

Circumstances have changed, and this ideal arrangement no longer applies, as is shown by an extreme case in 1950 for the North Thames Gas Board. Resetting continued into the peak load period reducing the gas availability by 24 mill. cu.ft. or about 10% of the carbonizing plant, which had to be met by extra carbonizing plant or extra gasification plant. Other post-war years have been less serious in this respect. The reduction in coal gas capacity due to resetting during January of each post-war year shown has varied from 3.5 to 10.3%, whereas the average for the whole year has varied from 7 to 14%. The additional time taken for resetting and its encroachment into the winter season is due to the limited availability of retort setters for the needs of an expanding carbonizing industry, and many of them are attracted into the building industry itself.

Another circumstance which has changed, is the growing proportion of gasification plant as distinct from carbonizing plant, whereby temporary and even seasonal changes are covered by gasification plants, leaving the coal gas plant more and more as a base load plant. Carbonization plant gains greatly from this uninterrupted production. Equally, this policy emphasizes the disadvantage of having a proportion of carbonizing plant out of action for resetting at any time of the year.

When an installation is to be shut down for repairs, the extent of the repair or replacement depends primarily on the condition of the retorts, but a choice of patching, top half resetting, retort refacing or monolith renewal may be possible. As examples of the range of choice the following resetting schedules have been chosen for different cycle periods and costs graphed in Fig. 1:

(A) A straight run through without interruption from resetting to resetting. The curve 'A' shows the cost of this programme if capital costs may be ignored.
(B) The same schedule, but the capital charges have been included in this and the remaining curves.
(C) A schedule including a cold patching programme between resettings.
(D) A schedule including a half resetting between full resetting.
(E) A schedule involving the sequence—cold patch, half resetting, cold patch and resetting.

The comparison of curves 'A' and 'B' shows the important influence of capital charges which amount to about 40% of the total resetting charge. If the resetting can be accommodated within periods of low gas demand, the capital charges may be disregarded, but not if the coal gas plant is operating on a base load, when capital charges for unproductive time need to be taken into account.

All the curves fall steeply showing the great advantages to be gained by extending the service life of the refractories. The choice of programme should include a schedule of hot repairs, but it can be shown that if hot repairs require the retorts to be unproductive for one day in thirty while the

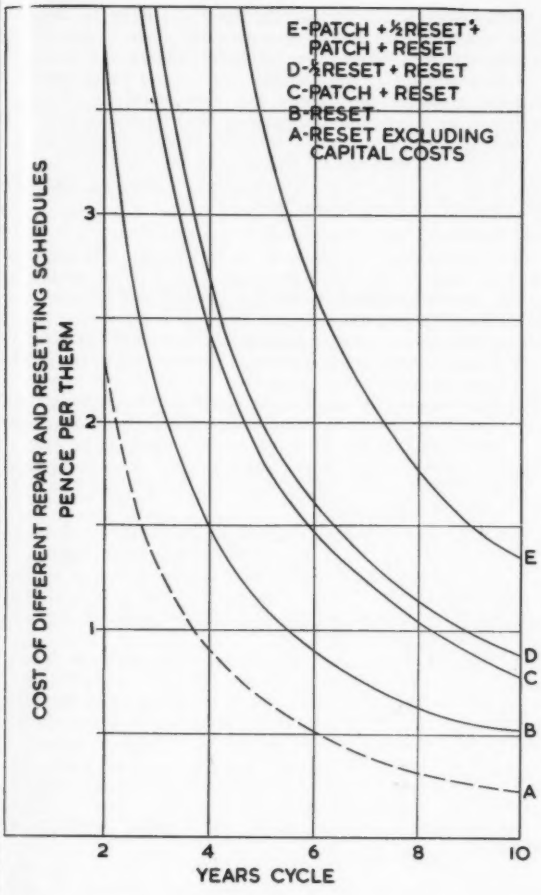


Fig. 1.—Cost of different repair and resetting schedules.

repairs are carried out, the additional costs are greater than the costs of a cold patch. Another choice available is whether it is better to operate the retorts at lower temperatures to prolong their lives, or to increase the output by higher temperatures and face the cost of an earlier reset.

An examination of the curves shows that it is as economical to reset retorts on a five year cycle as to carry out intermediate half-resetting on an eight year cycle. With the complicated schedule 'E' on a ten year cycle, a working life of about 3,000 days is reached, but this is shown to be more costly than a five year cycle on schedule 'B' giving little more than half the life at 1,570 gasmaking days. Thus long length of working life of retorts is not necessarily an indication that the most economical life has been achieved, if the long life has been attained by many cold repairs. Long and uninterrupted working life between resettings is, of course, the cheapest schedule

Improvement in Refractory Life

There has been very early collaboration of the gas industry with centres of refractories research, for in 1909 the Refractory Materials Committee was formed by the Institution of Gas Engineers and the Retort and Firebrick Section of The Society of British Gas Industries, with the object of developing specifications and testing methods. Three specifications were published in 1912. From the beginning Dr. Mellor of the Staffordshire County Pottery Laboratories was the Technical Adviser. In 1920 this organization was taken over by the British Refractories Research Association, later to be incorporated with the British Pottery Research Association to form the British Ceramic Research Association. Recently, splendidly equipped laboratories have been opened and as an indication of its importance, it had an income of nearly £170,000 in 1953.

The Joint Refractory Materials Committee has made revisions of the Standard Specification for Refractory Material for Gasworks in 1922, 1925, 1934 and 1946, as experience in the use of refractories has revealed the desirability of modifications. Recently another Committee, under the Chairmanship of Professor Roberts of Leeds University, has been formed with wider representation, *i.e.*,—from each of the twelve area gas boards, the Society of British Gas Industries and the British Coking Industry Association and with a representative of the Director of the British Ceramic Research Association. This Committee has prepared specifications to cover the eight main refractory materials other than cements, which are used by the carbonizing industry in Great Britain, and these are due to be operative from April 1, 1955.

None of these specifications includes jointing cements, but some control may be exercised through special area board specifications. In respect of jointing cements, there is much use of proprietary material which is not controlled except through the clause that 'it shall be suitable for its purpose,' The British Standards Institution in 1952 published their first specification (B.S. 1902) for the Methods of Testing Refractory Materials, and this is the basis of testing for the 1955 Gas and Coking Industries Refractories Specification.

Besides the development of specifications, the Joint Refractories Committee sponsors research and development work, which is described in Annual Reports and in 1955 the 46th Report will be published. Particularly in recent years, there has been an increase in the number of field trials and these are of particular interest from the point of view of this paper. Members of the staff of the British Ceramic Research Association have carried out dimensional and temperature surveys of settings, trials of new refractories and studies of the causes of deterioration of settings, and much specialized knowledge is being accumulated.

There are other centres of research and development activity in respect of refractories used in the gas industry, and research work is carried out at Leeds University, which has a special department devoted to gas engineering, at the Fulham Laboratories which are now a research centre of the British Gas Council and at other centres in the gas industry. The manufacturers of refractories are active in their own development programmes, and there is a high standard of collaboration between manufacturers, constructors and operators of carbonizing plant. This extremely valuable collaboration has done much to improve the quality of refractories and the life to be expected from them. Extra length of life may not always have been the benefit chosen for there may have been a preference for greater output by using higher temperatures.

General Factors Affecting Refractories

Before proceeding to discuss the specific details of each type of carbonizing plant, there are some aspects which are common to all types and are appropriately dealt with at this stage.

Control of Refractories

Although there is a growing shortage of native rocks suitable for refractories production, there is no appreciable tendency to exploit inferior sources of material. The control during manufacture and control by the client grows more and more rigid. Manufacturers are taking more and more care in the choice and cleaning of raw materials, in instrumentation of kilns and by statistical sampling methods and use of a control property such as specific gravity during firing. A comparison of the true specific gravity of silica in 1927 and 1937, according to F. B. Richards showed that in 1927 about 50% was below 2.34 and by 1937 this had increased to 82%. Samples taken in 1954 by one area board averaged 2.33. The new national specification for silica requires average samples to be below 2.345.

Deviations from acceptable material are rejected first by the refractory manufacturers on emptying the kiln, but the remaining material is subject to control by an inspector representing the plant constructor and by the client on delivery at the site, where the material is also scrutinized for damage during transport. Samples in accordance with the specification are then taken and the chemical and physical criteria applied. The refractories which have successfully passed through all these screens of control are very likely to impart long life to the retort settings into which they go, if all other factors are favourable. Such material is worthy of good dry storage before use and careful handling on the building site is desirable.

Jointing Materials and Thickness of Joints

Jointing cements are excluded from the national specification although separately covered by some area boards. The diverse requirements are to some extent incompatible, and the final composition must be a compromise. Certain proprietary jointing cements are widely accepted without specification control. Although considerable experience has been gained, jointing materials remain potentially more vulnerable to attack from slagging agents and hydrocarbons, and the life of a retort is often determined by the joint rather than the brick. Consequently there is a desire for the minimum number of joints of the minimum practicable thickness.

There is a general insistence that the thickness of joints should not exceed $\frac{1}{8}$ in., and this becomes difficult if the shape of bricks has been affected by squatting, etc., and while the dimensional tolerance allows for 1.25% variation, this can prove awkward if there is an accumulative deviation from designed dimensions which would cause a failure to conform with levels of fixed points such as burner ports and sight-holes. The alternation of undersize and oversize bricks, in order to prevent accumulative deviations, slows up the progress of the work but may be a more acceptable expedient than varying joint thickness.

Expansion Spaces and Bracing

All types of carbonizing plant require to allow for the thermal and allotropic expansions of the refractories, and this may be done by subdividing the setting into rectangular blocks separated from neighbouring blocks by expansion spaces. The expansion allowance made for silica varies between 1 and 2% in which, at the lower range, it is supposed that joint compression takes place, and at the higher range the designers have taken into account after-expansion.

To ensure that joints remain tight and that expansion spaces are taken up, retort bracing is supplied which, in its crudest form, relies upon the bending of cross connections between buckstays, but in the more refined forms depend upon compression of spring packing, or on adjustment of volute springs to precise dimensions and hence to a pre-determined pressure. Even if expansion spaces are fully used up on the first heating up, there is considerable doubt about their effectiveness on a second heating up, which stresses the undesirability of shutting down settings before the need to reset. Because of this doubt some recent installations dispense with transverse expansion spaces and rely upon outward movement against spring loaded bracing.

Producer Gas Supply

With the exception of rare occasions when the few coke oven batteries may be coal gas fired, all carbonizing installations in the British gas industry are heated by producer gas, and most of this is derived from step-grate producers either integral with or close to the settings. This has been in order to retain the sensible heat of the gases and, in the case of horizonal settings, to take hot coke direct from the retorts. The general proximity of the producers and the variability in gas supply due to the clinkering operations, is prone to cause ash dust to be entrained into the combustion chambers, and this leads to either a harmless sintered deposit or a liquid slag—depending on ash characteristics. The attack by ash particles on the combustion side does not appear to be a decisive factor in determining the length of life of retorts, but it may well be the cause of secondary deterioration once a leak has been started, particularly if the pressure conditions during gasmaking or scurfing may cause a flow of dusty waste gas into the retort via the leak. Regenerative systems of heating as in coke ovens, some horizontal chambers and one continuous vertical retort installation in this country require cold clean producer gas, and this is derived from mechanical producers which may, after wet cleaning, still contain 10 lb. of dust per ton of producer fuel, but by electrostatic precipitation this can be reduced to negligible concentrations.

The production of water gas in Great Britain is highly developed, and mechanized units of high capacity are installed, but in the case of mechanical producers there has been a relatively slow rate of adoption because of comparatively high capital charges, particularly if small fuel with low rates of gasification is to be used. Many recent installations have included mechanical producers to eliminate the labour of clinkering. To avoid the loss of the sensible heat from the producer gas, some of these plants include simple hot cyclone dust arrestors which remove the larger particles of dust but allow the finer particles to go into and, perhaps, through the heating system. When there has been sufficient experience, it will be interesting to find whether the regular supply of clean uniform producer gas, which has been partially dedusted, proves to be a factor favouring long life of refractories.

Over the course of years there has been a remarkable fall in the fuel requirements of settings and this in itself improves the conditions of service for refractories by reducing the intake of impurities in the producer gas.

Hot Repairs

The development of methods of hot repair of retorts has been an important factor in prolonging the lives of refractories and in improving gas tightness because neglected leaks increase the rate of deterioration.

The principal methods which have been dealt with are:

(i) Wet methods, using jointing cement applied by paddle, spraying machine or gun.

(ii) Hot welding, by using an oxy-coal gas blowpipe in which refractory powder is injected into the oxygen stream and passes through the flame on to the surface to be filled.

(iii) Airborne sealing powder, whereby a finely ground powder is fed into the air intake of a fan used to supply air to a closed empty retort.

The wet method of applying jointing cement by hand tools is limited to accessible areas, but is useful in firebrick zones.

Many operators still find it a benefit to fire a slug of jointing cement into a joint. The mouthpiece of the gun is charged with the pasty cement and the gun directed with fair precision to the joint to be repaired.

In 1931 the Birmingham Gas Department began to develop a method of silica welding. The dry cement is introduced into the oxygen stream of an oxy-coal gas blowpipe and the flame directed against the surface to be repaired. It is an effective method and widely practised, but its slow rate of deposition makes it unsuitable for large holes, nor can it be easily used in the top half of the retort by downward welding. Welding is not able to keep pace with the rate of loss due to flaking in the severest cases, and welds on slagged surfaces are unreliable.

More recently the airborne sealing method has been described. Into the blower is fed a fine powder of clay, refractory and flux, which is intended to drift, in the retort to which it is fed, towards the leak, and bring about a seal by precipitation on the walls of the leak, followed by sintering and conglomeration. The method is easily applied at the last stage of scurfing without serious loss of gas-making time. Injection is continued until a standard pressure is attained in the retort.

Scurfing introduces the possibility of dangerously increasing the temperatures of refractories by adding the heat of combustion to the heat supplied through the retort walls. Furthermore, there is a possibility of brickwork being pulled off by the scurf as it distorts under the heat effect of its own combustion and buckles off the wall. This flaking is known to occur in continuous vertical retorts but seems to be more rare in the case of intermittent systems. Intermittent charging gives the opportunity for scurfing to occur at each charging by leaving the retort, chamber or oven open for a period varying from 15 minutes to an hour, in order to limit the scurf to a thin film over the brickwork and thereby retain the tightness of the retort. This is not possible with continuous systems, and it is necessary to empty the retort completely for scurfing. Scurfing without emptying, by the heavy steaming of a stopped retort, has been tried but is ineffective. The distribution of scurf is not uniform, and only from the evidence of quenched retorts is the thickness of the deposit determinable with certainty. Scurf also gives protection against ash attack. If left too long the scurf accumulates to an extent which reduces retort dimensions, and there comes a certain time when scurf tends to buckle off the retort wall even while the retort is working. It causes sticking charges and this detachment of scurf tends to occur more with new retorts because of their smoothness.

In anticipation of the enhanced heat supply by combustion, adjustments are made on the dampers before scurfing actually begins. Scurfing of vertical retort chambers is now widely done in a 'downward' direction, and a portable chimney placed on the top castings provides sufficient buoyancy to cause air to be drawn into the retort at any opening and under perfect control. To reduce the heat development, some eng-

ners prefer to have a proportion of steam. The nature of the bond between scurf and refractories has a considerable bearing on the phenomenon of flaking, and further research is being pursued.

Liquor Sprays

It is now considered very desirable in all systems that the crude gas leaving the retort should, as early as possible, be drenched in a spray of weak liquor. The earlier this can be done, the smaller the un-wetted areas which need to be cleaned free from pitchy deposits. If, however, the spray is too near, there is a risk of liquor flowing back into the retort and damaging the refractories.

Four Principal Systems of Carbonization

It is now convenient to consider in detail experiences in the British gas industry, of horizontal retorts, continuous vertical retorts, intermittent vertical chambers and coke ovens. They have been derived from published information, private communications or from the experience in the author's own area board.

(i) *Horizontal Retorts*

Although horizontal retorts originate from the earliest days of the gas industry, they still provide an important though diminishing contribution to the national output of gas. As their use declines, more and more ingenuity is devoted to their improvement. High fuel requirements have been partially offset by installing waste heat boilers, by jacketed settings and in one case, by dry quenching of coke. Attempts to reduce hard manual labour have been made by introducing the standpipe system. Longer life of refractories has been established by improvements in design details, and by adopting recirculating of waste gases. One variation has been the development of horizontal chambers, sometimes with regenerative heating. Nevertheless, in very large works their place is being taken by coke ovens, and small works where horizontal retorts have been predominant are being closed down as integration proceeds. The flexibility of operation of horizontal retorts has become a less valuable advantage as seasonal variations are being covered by gasification plants. Horizontal retorts accounted for 20.5% of the gas output capacity in recent years, or 32% of carbonizing capacity.

The former South Metropolitan Gas Company, now vested in the South Eastern Gas Board, pursued a gas production policy based solely and undeviatingly on horizontal retorts and has concentrated with a single-minded devotion on the technical improvement of the horizontal retort. In doing so they have achieved a length of life of the refractories which is most noteworthy. During the last thirty years they have been able to improve the working life of the settings from 1,500 days to over 5,000 days, and during the same period the throughput of coal per retort per day has increased 20%.

(ii) *Continuous Vertical Retorts*

In Great Britain continuous vertical retorts form a predominant proportion (58%) of the gasworks carbonizing installations, and may be classified into the rectangular and oval shapes. The rectangular retort is built with top and bottom sections in firebrick to avoid thermal spalling, and the main zone between is constructed of silica. The retort may be built in a robust rectangular monolithic block which includes the heating flues, and there is bonding from retort to outer combustion chamber wall. Much attention has been given to the minor and major axis taper in these retorts, particularly to suit the carbonization of highly swelling Durham run-of-mine coal.

Similarly, the oval retort has passed through many stages of development. It differs from the rectangular retort in that it has a degree of structural independence and is loosely supported by floor tiles between the two combustion chambers. Again top and bottom zones are constructed in firebrick with siliceous or silica retorts. The oval retort does not lend itself to resisting compressive forces along the major axis without weakening the shoulders, but this weakness is corrected in the most recent design. The heating system is by producer gas along horizontal flues, finally circulating in the upper half. Heating is done from both sides of the setting, thereby achieving a desirable symmetry.

Vertical retort designers have gradually improved the simplicity of the settings themselves by discarding the recuperators of the earliest design and adopting recovery by waste heat boilers (and latest of all by gas turbine). The integral producer was frequently designed so that the back wall of the producer was carried up as the front wall of the setting and the lifting effect of this back wall, particularly on going over to gaseous firing, has been sufficient to jack up the settings by ¼ in. Since this occurred on one side only, it caused a racking of the retort joints, particularly on the producer side. The proximity of air flues increases the potential damage. Later designs involving the attachment of the producer gas supply by a vertical sliding joint have overcome the distortion, and it is significant that in the later settings the producer side retorts do not deteriorate any faster than the others.

In respect of bracing, there have been recent examples where the coal bunkers have been built on portal frames which are quite independent of the setting steelwork, which is therefore released for its primary purpose. The main buckstays are thus able to take the rigid bracing of the top and bottom firebrick zones, while intermediate vertical buckstays on the centre lines of the retorts in the silica zone are formed into a mattress pressing against the brickwork under the compressive force of adjustable volute springs. With a similar object, another type of retort bracing makes use of metal strips with pressed-out tongues which are only flattened by the pressure of the expanding setting, but this type is not capable of precise adjustment.

Retort benches are no longer designed as long as 170 ft., and such installations have by now been divided into two, even at the loss of four retorts. Greater structural stability results from limiting the accumulative distortion.

In considering the deterioration of continuous vertical retorts, three main causes can be considered:—

(1) Flaking in the upper silica zone;
(2) Ash and alkali attack, particularly on siliceous retorts; and
(3) Opening up of joints through mechanical causes.

Flaking is a process involving loss of material from the faces and edges of retort brickwork. Flakes are observed to be attached to sheets of scurf which may buckle off the surface and occasionally flakes of refractory may be recovered from the retort wall after all carbon has been burnt off. It can lead to a loss of brickwork amounting to 1 cu. in. for each ton of coal carbonized, and since this is localized within about a 5 ft. band, its effect may well be to reverse the retort taper leading to bad coal travel and secondary effects unfavourable to the silica. The progress of the rate of flaking has been measured as well as possible by a gauge used during scurfing. The flaking is not essentially a temperature effect

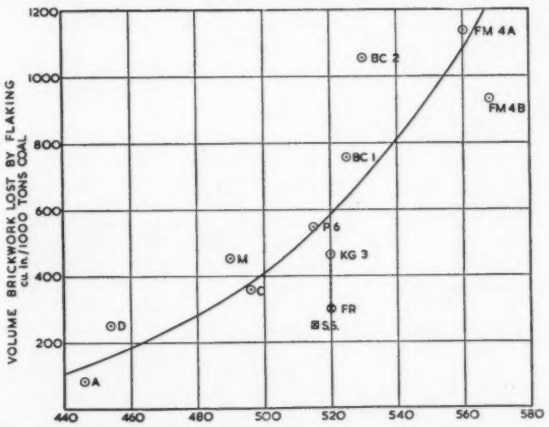


Fig. 2. Relationship between flaking index and calorific value of gas made.

because it occurs in roughly the same zone whether the heating be upward or downward. Siliceous retorts scarcely suffer from flaking, but do so rapidly from slag attack which will bring them to an end of their useful service at least as early. Slag attack is greatest where there is least protection from scurf. A convenient way of correlating the various measurements taken of flaked retorts is to use the flaking index-volume in cubic inches of refractory lost per 1,000 tons of coal carbonized. (Fig. 2.) The relationship of flaking with calorific value may be connected with some influence of concentration and nature of the hydrocarbons in crude continuous vertical

retort gas, leading to a special bond of attachment between scurf and brick. The relationship could also be simply based on the frequency of scurfing, for the retorts making the highest calorific value are required to be scurfed with perhaps three times the frequency of those at the lowest calorific value.

A trial was carried out of sillimanite in an installation where severe flaking was experienced, but it was disappointing to find that the sillimanite failed very much as an earlier trial of supposedly inferior material had failed.

Reports of the freedom from flaking of French silica, made from Belgian quartzite, prompted a number of trials along with a limited trial of Silcrete, of South African origin. These comparative trials, as far as they have gone, indicate the importance of low porosity, low permeability and perhaps high mechanical strength at working temperatures. The evidence is distinctly encouraging, and no doubt manufacturers will be able to take steps to introduce these desirable properties into silica to be used in flaking zones. The French silica had a porosity of 25% and the Silcrete about 17%, so that silica to be used in flaking zones should be lower than 20% in porosity. Further trials are in progress with Silcrete and with 50% alumina material. A few pieces of electrocast material have been also introduced to provide research information in respect of material of practically zero porosity.

There is a considerable interest being devoted to the search for a non-flaking refractory material suitable for building into the affected zone of continuous vertical retorts. This would represent a notable advance for the installations where calorific value, coal and other circumstances make flaking the predominant cause of the service lives of refractories being below the average.

Siliceous material is less prone to flaking than silica, and this may be due to lower refractoriness and the formation of an impervious glaze on the surface. On the other hand siliceous material is more susceptible to attack by ferrous oxide which is released from coke by steaming reactions. By slag attack a siliceous retort may be reduced in thickness back to the tongue and groove in well under 2,000 days, with the falling out of a panel imminent.

Siliceous retorts are more susceptible to alkali attack than silica, and experience has shown that it is unwise to use siliceous material for carbonizing coals of an alkali content exceeding 0.5%, *e.g.*, many Yorkshire coals, but it is possible to use siliceous material for carbonizing coals of less alkali content than 0.25%, *e.g.*—most Durham coals.

An unusual case of alkali attack occurred in silica retorts charged with coal specially mixed with 0.5% of sodium carbonate and 1.25% of calcium carbonate in order to produce an activated coke. After 500 days on this process, the lower courses of silica showed erosion especially in the corners.

(iii) Intermittent Vertical Chambers

In the British gas industry, intermittent vertical chambers, introduced nearly 30 years ago, are now used for 7% of the coal gas output and carbonize about two million tons of coal per annum. They are rectangular chambers and have a minor axis taper to assist discharge, but this taper is much less than in the case of continuous vertical retorts. The chambers are built in silica but with top and bottom zones of fireclay to withstand thermal spalling. Usually the producers are integral with the settings and extend to the full height, but some later installations have adopted external producers. Since the system is static, the coke is discharged hot; the waste gases leave at temperatures which require a system of recuperation, which adds a complication to design which is nowadays avoided in the continuous vertical retort installation.

The installations are operated on a carbonizing period and steaming period, but the steam addition is limited in order to avoid steam erosion of the chamber bottom. Consequently they are operated in the range 525-580 B.Th.U. per cu.ft. They are normally supplied with small or run-of-mine coal. It is surprising that intermittent vertical chambers with silica material similar to that used in continuous vertical retorts, with calorific values usually higher, and possibly operated on a similar scurfing cycle, should show no appreciable flaking.

In intermittent vertical chamber installations, scurfing is either done on the basis of a small period of burn-off before each charge or by scurfing for a full charging period, perhaps every fortnight, and then with upward or downward scurfing. Spraying has been found to lead to repairs which are poor in adhesion, or which act as obstructions to dropping of charges. Airborne powder sealing is widely adopted.

Thus the intermittent vertical chamber installations have had their service life of the refractories increased to 2,300 ± 600 days due to elimination of causes of trouble in foundations, to better bracing, to detailed development of brickwork design and to improvements in operational technique and not maintenance. The scope for further improvement would appear to be in a redesign of the bottom firebrick, an improvement in its quality and in that of its jointing material and in a simplification of the structure by a separation of recuperators and producers from the chamber setting proper, in order to avoid unsymmetrical movements of the settings.

(iv) Coke Ovens

The British gas industry derives an increasing proportion of its gas from the coke oven industry (in 1953-54 it was over 12%), but the gas industry itself has relatively little experience of coke ovens. In 1912 and 1914 two batteries of coke ovens were built at Saltley gasworks, Birmingham, but when the time came to rebuild them, they were dismantled, for specialization in continuous vertical retorts had become the Birmingham policy. In 1932, the Gas Light and Coke Company at Beckton put two batteries to work each of 30 Koppers circulation compound ovens, to be followed by two more Woodall-Duckham-Koppers in 1948 and 1949, and a fifth battery is now reaching completion. In the meantime, the South Eastern Gas Board put two batteries of twenty-two Simon Carves twin-flue combination ovens at the East Greenwich works in 1950 and have followed with another in 1953 and a fourth is under construction.

The first battery at Beckton is still at work and is likely to remain so for a little longer, but the second one was shut down in 1948 not because its condition urgently demanded it but because it was planned to avoid having two simultaneous rebuildings and because it was convenient to shut down No. 2 to facilitate building of the third battery. To members of the gas industry the service life of the first battery is very impressive, although similar lives are encountered in the coke oven industry. Its life is all the more remarkable because the coal used has included a proportion of gas coal, and during the war the ovens were required to be charged by day only, which greatly interfered with the desirable regularity of operations.

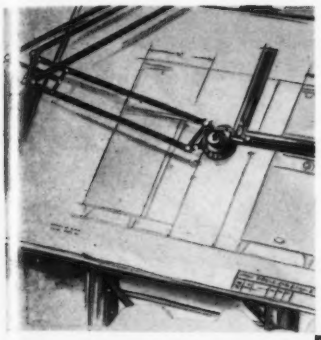
Hot maintenance of the ovens has been carried out by patching vertical cracks at the end flue with sillimanite, but this has a short life and needs renewal. Several cracks (and deep spalls) adjacent to end flues have been hot-welded, but the process is slow, and cooling of the walls during welding is considered to be harmful. The brick-work around the door frames and up to the end flues has been replaced with fireclay. The original sole blocks have not been replaced. Thus the limited experience with coke ovens in the gas industry itself has been favourable, and the good service life of the refractories is similar to that realised in other coke ovens. Compared with other types of carbonizing plant it is markedly superior in this respect and is one of the factors favouring the replacement of horizontal retorts where the size of the unit is justified and the neighbourhood is industrial.

When No. 2 Battery was shut down after over 6,000 days work it was found to be in a condition which subsequent experience suggests would have enabled it to last for another seven years.

Conclusion

There has been an appreciable improvement in the service life of refractories due to improvements in refractories themselves, to increased stability of settings due to greater symmetry and simplicity of heating systems, and a greater understanding of the functions of steelwork and retort bracing.

Valuable experience is being gained in field trials of new materials and in temperature and dimensional surveys, by collaboration between constructors, operators and investigators. More trials under industrial conditions are needed, although they are expensive and necessarily slow to prove or disprove the wisdom of choice of material or design. They are an essential complement to laboratory investigations. The data being accumulated are helping towards a clearer understanding of the problems involved in attaining an extension of the service life of refractories.



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TAKING STOCK*

By F. G. COX, T.D., M.Inst.Gas E.

AT intervals during the year it is a very good thing to have a mental stock-taking in the same way that, on taking a physical stock of stores, one not only counts the stores in hand but takes the opportunity to use this information as a basis for re-ordering, so one can, by a mental stock-taking, review the position, make plans and formulate a policy for the future.

To my mind, one of the salient features in 1954 was the emphasis placed on increased production, and in that year, and solely due to increased efficiency and better methods of production, it is officially estimated that there was a general increase of 5% in the industrial output of the country as a whole. I feel sure that the gas industry played its part in contributing towards this happy state of affairs—but I also feel that the same could be said of our competitors. One must always bear in mind that prosperity, like peace, must continually be paid for—Fate letting it out only on simple hire, so that there is never a final instalment. There is, in fact, no standing still—one either goes forward or backward—and while one should be encouraged by the results of the post-war years, it must be the objective of all to strive continually for better results.

We must all be aware that our competitors in the fuel services are far from being at a standstill, and one can hardly pick up any technical magazine on fuel usage without reading of further advances they have made in plant efficiency and in new fields in which their fuel is now competing with ours. It is interesting to note the increasing attention that is being given to harnessing the forces of nature to provide fresh sources of power, and it is noteworthy that in almost every case, these natural sources of energy are being used for direct conversion to electrical energy.

Although we should do well to bear these things in mind, we should at the same time appreciate the fact that, at present, the conversion of atomic energy into power for such purposes is not an economic proposition. We know for instance that in America there is a submarine powered by atomic energy but the cost of this was in the region of £19 mill. Also, it is not expected that for a few years, at any rate, the cost of producing electricity by means of atomic energy will be any less than the cost by means in use at present.

Electricity is not the only fuel competitor that is making strides towards reducing the cost of its product to the public. Notable improvements have been made by oil, especially in the industrial field, and although the efficiency of the average oil burner has increased but slightly since the war, the efficiency of an oil-fired boiler has, by improvement in design and the use of flue economizers, been increased by some 5% to 7½% until it can now be reckoned as about 75% efficiency—even when allowance is made for the preheating required by heavy oil. There is, of course, a variation in oil prices in different parts of the country but the fact that the cost per useful therm of light oil may be taken at about 9¾d. and that of heavy oil at about 8d. is something that one cannot afford to overlook. Our oil competitors have not been slow to exploit to their advantage the one asset which was for so long almost a monopoly of gaseous fuel—namely thermostatic control. Although not yet capable of adjustment within such fine limits as a gas-fired installation, an oil burning installation using light oil can now be made fully automatic.

On large installations there is, no doubt, a strong case for the use of automatic stokers and much though it may pain us to think of unprocessed coal being used for space-heating, it cannot be denied that, to a consumer whose primary object is a low cost fuel, the use of an automatic stoker operating at approximately 80% efficiency and at a cost per useful therm of about 5d. is an attractive proposition. Now, if we are to put into practice our mental stock-taking and are to review and appreciate the situation, we must follow the process through to its logical conclusion and decide what is to be done about it. It seems, broadly speaking, that our efforts must be towards one of two objectives, depending on whether we are engaged on the manufacturing side or the distribution and sales side of the industry, and these objectives are: (a) The stabilization, if not the reduction, in the price per therm available to the public, and (b) The increase in consumption per consumer. Neither of these objectives are new, but I feel that it is a good thing to bear them constantly in mind, and have them ever before us.

Stabilization of Prices

The attainment of the first objective will be largely governed by the prices that have to be paid for labour and material, but in view of recent trends, it seems that both of these commodities are more likely to increase in price, rather than decrease. There is a limit as to the extent that such increases may be held by our industry, increases which, sooner or later, may have to be passed on to the consumer. There have been many instances where, owing to increased efficiency in plant operation and savings effected by integrating small uneconomic undertakings, such increases have been borne by the industry. Once such undertakings are integrated, it cannot be expected that the remaining undertakings can increase their efficiency year by year indefinitely, so the margin for improvement must decrease accordingly. If the standard of service the public has a right to expect from us is to be maintained and improved, then there is a limit beyond which the labour employed cannot be reduced. Any reductions beyond that point would result either in inferior consumers' service, or probably increased charges due to overtime necessary to maintain the standard of service.

Research is constantly being carried out to find a cheaper raw material for processing, such as natural gas; the use of other gases such as butane; the total gasification of coal; and the conversion of petroleum products to town gas. So far results in this country have not been startling, but any major discovery which would provide us with a cheaper raw material would be of paramount importance to our industry. It is, of course, somewhat disappointing that up to the present time the Gas Council have been unsuccessful in their search for natural gas in commercial quantities, although borings in Sussex were taken to a depth almost twice that originally planned. It is understood, however, that further surveys and borings are likely to take place in Sussex and Yorkshire. The search for natural gas in this country has by no means been abandoned.

The subject of unaccounted-for gas, and the importance of reducing this figure is a matter which has formed the subject of many papers in the past. During the financial year ending March 31, 1954, unaccounted-for gas in the Eastern Gas Board's area as a whole was 6.29%. Assuming that any decrease in this figure would be reflected in the cost of manufacture, and making allowances for the value of by-products, if this figure were reduced by only 1% there would be a saving of about £40,000 in the cost of raw materials. It is realized that every undertaking may not be able to effect a reduction of 1% in its unaccounted-for figure, but, at the same time, it is felt that many of the smaller undertakings could effect reductions greater than this.

The increase in the thermal yield per ton of coal carbonized is another subject dear to the heart of the gas engineer from earliest times. In the Eastern Gas Board's area, if only one extra therm could have been obtained from each ton of coal carbonized during the financial year ending March 31, 1954, the gross saving to the Board in raw materials would have been in the order of £100,000. After allowance has been made for the value of coke, tar and other by-products this would still leave a substantial net saving of approximately £42,000. The saving effected by reducing the unaccounted-for gas figure by 1% is about the same as increasing the

* A slightly abridged version of the address presented by Mr. Cox, the new President, at the inaugural meeting of the Eastern Junior Gas Association, September 24, 1955.

total thermal yield by 1 therm per ton of coal carbonized.

There are, I feel, many improvements that could be made in the field of administration and, in our mental stock-taking, it would be as well to see what can be done in that direction, and not to jog along complacently with the same system that has been in use for many many years. I can recall the introduction of pre-paid reply cards for the use of consumers in respect of meter readings and fitting work. Prior to the introduction of this system it was not uncommon for a fitter or a meter-reader to call at a house three or four times before finding someone at home, and considering the number of homes where both husband and wife are out to work, this is not surprising. Nowadays, if the consumer is not at home on the first call a pre-paid reply card, under business licence, is left. In the case of fitting work, the consumer is asked to state on the card a date and time (with suitable notice) when it will be convenient for this work to be done, and this appointment is duly booked. Where a meter reading is required, the consumer is asked to mark on dials printed on the card the position of the indices—the card is posted, and the account rendered without further delay. Should the consumer have made an error in showing the position of the indices, then this matter is put right on the next account. I am a firm believer, also, in the use of the telephone, especially for local calls. In many cases, the call can be made at a fraction of the cost of sending a letter, when the cost of stationery, postage and typist's time are all taken into account.

Transport is another field in which possibilities for increased efficiency exist. Cases have not been unknown where the works and distribution transport worked so much apart that the men have been thought to be employed by different firms. Economies may be effected by the purchase of additional transport—for instance, an undertaking ruthlessly keeping its transport strength down, despite ever-increasing business, may well find that it is paying more for hired transport than the cost of an additional vehicle and driver, with a poorer consumers' service into the bargain. In scattered rural areas, it may well be that a parent undertaking would save money by having its own transport to take fitters to outlying districts, rather than relying on local bus or train services.

Increasing Consumption

How to increase the consumption per consumer, is to my mind, the major problem confronting the distribution and sales side of the industry today, and in tackling this problem, steps must be taken to ensure that existing consumers are retained and new ones acquired. It would, I feel, simplify matters if this problem were considered under two headings—(a) domestic consumers, and (b) industrial and commercial consumers.

Domestic Consumers

Considering that the majority of consumers are domestic (in this Board's area, the figure being about 95%) concern must be felt that the consumption per domestic consumer has recently shown a tendency to decrease, and although this decrease is numerically small, the fact that it affects the bulk of our consumers, greatly increases its significance. The greater part of the domestic load is obtained from the domestic cooker, and there is no doubt that improvements in the design and efficiency of this appliance have meant that the housewife now uses less gas on her modern cooker than before. After all, we do bring to the notice of our consumers, that, in this field, three therms of gas now do the work of five.

It has also been argued that, whereas many people hitherto have been living in overcrowded conditions, the great strides that have been made in postwar housing development have meant that fewer families are sharing the same cooking facilities, and that although the same amount of cooking undoubtedly still goes on—the net result shows a decrease in the consumption per consumer. Another factor which affects my own Area in particular is that in many homes where overcrowding existed, hot water was often supplied from a geyser, all occupants using gas for their hot baths. A great number of such people have now been re-housed in Council houses where solid fuel—usually in the form of back-boilers—provides the domestic hot water requirements, and this is a load which we have undoubtedly lost, although such grates are generally designed to burn coke and most have gas ignition.

If we are to achieve our aim we must sell more appliances, having first aroused the consumer's interest and convinced him that such and such an appliance is an absolute 'must.' Th border line between what is considered an essential and wha is a luxury, is a matter for each individual to decide—no tw people ever agreeing completely on this. A consumer wit limited means who has a gas cooker and no other means o cooking might regard his cooker as an essential and all othe gas appliances as luxuries. It is up to us to convince hin of the need for other appliances, and this we can do by convincing him that he, personally, will benefit by saving o time and money, safeguarding his health and improving hi comfort and standard of living. Last but not least we migh touch upon that strain of vanity all of us have in some degree or other—that of 'keeping up with the Joneses.' As far as existing consumers are concerned, I feel that our aim must be to maintain and increase the cooking load, and to effect sales of appliances in the fields of hot water, space-heating and refrigeration. We have recently had two most powerful aids—the lifting of restrictions on advertising and the introduction of commission schemes—let us use them to the full.

It is interesting to note that if we could induce every one of the Eastern Gas Board's domestic consumers to install even a gas poker, with an estimated annual consumption of 7 therms, the increase in gas sales would be no less than 4,711,000 therms per annum. The significance of this figure is that it represents an increase in gas sales to domestic consumers of about 6%, and an increase of about 3.7% on all gas sold during the financial year ending March 31, 1954. During the same year, the number of domestic consumers in the Board's area increased by 16,655 and taking an average figure of 116 therms each, the additional gas sales would be 1,931,980 therms. In other words, if all the Eastern Gas Board's existing consumers had had a gas poker installed (or some other appliance using 7 therms per annum) the sales of gas derived therefrom is nearly 2½ times the increase in gas sales from new consumers, and this would be accomplished without any expenditure on new mains and services, estimated at approximately £500,000.

To take this example a stage further it could be said that the maximum expenditure necessary to produce this additional amount of gas for existing consumers would be, (a) the cost of gas manufactured and purchased together with, (b) the cost of distribution and consumer service—a total cost of 13.75d. per therm. Since the average price of gas sold to domestic consumers was 20.30d. per therm, by difference, the net profit from our 'gas poker,' would be 6.55d. per therm, though it will be realized that, although this would not affect the peak load, some undertakings might have to make provision for additional storage and/or gasmaking plant. Since the figure of 13.75d. per therm includes the cost of rendering and collection of accounts, it may be assumed that no extra cost would be involved in obtaining this additional revenue from existing consumers. Subject to these assumptions, the increased profit from sales of the additional 4,711,000 therms would be £128,500. In the financial year under consideration, the Board showed a deficit of £17,322—such an increased consumption, other things being equal, would have brought about a profit of £111,178.

My own view is that it would pay us to give away a gas poker to every existing consumer who would pay us to fix it. Assuming an average net cost price for a gas poker of 5s., a write-off period of only 5 years, and an average annual depreciation of 22.7% to allow for interest charges on capital, the annual payments would be approximately £34,828. Therefore, the net profit to the Board, even when we give away a poker to every existing consumer would be £111,178 − £34,828 = £76,350 per annum. This assumes that no profit would be made out of installation charges, the loading on fixing merely covering overheads.

The industry has a wide range of modern and efficient appliances at its disposal, and obviously, appliances having a higher annual consumption if sold on such a scale, would be of even greater benefit, and would have even greater effects on the economy of our industry. Unfortunately, time does not permit me to enlarge upon the case of gas for water-heating, but when we recollect there are still over 5 mill. houses in Britain without a hot water system of any kind, it will be realized that the potential in this field is enormous. Our chances of installing additional appliances, are, of course, very much increased if we can quote, in the showrooms, a price including fixing and if our consumer already has a suitable gas point in his house. This leads us, naturally, to the

uestion of carcassing new houses, and the importance of roviding each new house with an adequate number of gas oints cannot be over-emphasized. Only constant and personal contact with architects and builders can achieve this bject, and once gained, I feel that half the battle has been von in providing the additional appliances we must sell to ncrease our consumption per consumer. It is, of course, ery tempting to endeavour to obtain as high a contribution s possible from builders to offset the capital charges of laying as supplies to new houses, but my personal view is that, in he end, it will benefit us to have a fairly low standard charge or carcassing to a minimum of three points, with the added ttraction that no additional charge is made for any additional oints that are required.

Industrial and Commercial Consumers

Earlier in this address I referred to competition from other fuels, and to the form that such competition is likely to take n the future. Compared with the industrial Midlands, and he industrial North, the Eastern Gas Board, as a whole, does not rank as a heavy industrial area, yet its industrial and commercial consumers, while numerically under 5% of the total number of consumers, accounted during the last financial year, for over a third of the total gas sales. To emphasize the importance of this load still further, it could be stated that the industrial and commercial load was equivalent to the amount of gas taken by over 390,000 average domestic consumers, or that, on average, each of the industrial and commercial consumers used 1,419 therms—the same as would be used by just over 12 domestic consumers.

Every new industrial or commercial consumer could, in this light, be regarded, as the equivalent of 12 new domestic consumers, at the very least, and such a load is well worth having and increasing. In many cases, an increase of this load could be effected with little or no additional expenditure on new mains—further, in the majority of cases, the 'spread-over' consumption of industrial and commercial consumers, does not have anything like the effect on the peak load that the domestic consumption has. The non-domestic consumer is very useful and one who should, I feel, be cultivated to a much greater extent than at present. No business man is in business for pleasure—he is there for one reason only—what profit he can get out of his business. He is acutely 'cost-conscious' and is, no doubt, fully aware of what our competitors have to offer. His sales resistance is high—much higher than the average domestic consumer—and in choosing plant and equipment, he generally rates first the question of how much this will save him in hard cash.

In many cases it can be shown that, although gas may at first glance be considered more expensive than other fuels when compared on a purely thermal basis, yet the reliability, constant quality, and flexibility of our fuel, may well prove cheaper when saving in labour, risk of spoilage, installation and maintenance costs are all taken into account. Having gained our consumer, the next thing is to keep him, and increase his load. This, in my opinion, can only be effected by efficient maintenance and a 'service after sales' that is second to none. It must be obvious that this can only be accomplished if each administrative unit has an adequate staff of competent and enthusiastic industrial gas engineers who not only call upon the industrial or commercial consumer at his request, but who also have the time available to make regular calls upon him each year to check his equipment personally, to discuss with him any problems that he might have, and to keep him abreast of the times in new methods of production and new equipment. There are, of course, cases where no saving in labour can be effected, and the many other advantages of gas as a fuel cannot be used to good effect. An example of what I have in mind, is the continuous space-heating of a large building where a caretaker or stoker is necessary in any case. In such cases, where the price of gas may prove prohibitive, we should remember that we are a 'two-fuel' industry, and that coke and breeze (where available) will meet the situation.

As an illustration, I should like to mention the case of Norwich Cathedral, of which I can give a first-hand account. Until recently this beautiful and historic building was heated by a low-pressure hot water system of pipes and radiators served by three boilers having a combined rating of 2,252,700 B.Th.U. per hour—the fuel used being furnace coke. These boilers, which were nearing the end of their useful life, were fitted into a very restricted area, and the problem was to replace them by boilers which would maintain an internal temperature of 50°F. throughout the heating season, at the same time making the boilers more accessible for maintenance.

In view of the importance of this building, and the fact that other competitive fuels were being considered, notably fuel oil and the heat pump, the greatest possible care was taken in planning the new installation, and the maximum co-operation was achieved between the Board, at local level, the Area Coke Manager, the contracting heating engineer and the manufacturers. Full advantage was also taken of the valuable help freely given by the Coke Department of the Gas Council. As a result of these deliberations a scheme was eventually put forward and was accepted to replace the three old boilers by two new ones, having a combined rating of 2,296,000 B.Th.U. per hour, the boilers being fitted with Suxé firing units, and using coke breeze as fuel. The installation was made as fully automatic as possible by incorporating a time-switch and an air temperature compensator situated on the outside North wall of the Cathedral, in addition to the adjustable boiler temperature thermostat and flow water limitstat. While this work was being carried out, a new circulating pump was fitted, and considerable modifications were made to the existing pipework.

It will be appreciated that with the very limited income available to the Cathedral, it was of prime importance that both capital and running costs should be as low as possible—these aspects being even of more significance than in the case of a factory where a regular income may be expected.

The total cost of the installation was £2,375 of which £1,125 was for the installation of the Suxé units, the remainder being for new boilers which were required in any event. The case submitted by the Board to the Steward of the Dean and Chapter was that for an additional capital outlay of £1,125 the annual fuel bill could be cut from £800, with furnace coke, to about £425 with breeze, thus effecting a saving £375 per annum. Even allowing for increased depreciation, the new installation should show a net saving of about £300 per annum. This forecast was borne out in practice—the fuel bills for the two subsequent heating seasons showing a saving of £441 and £431.

I quote the installation in Norwich Cathedral for a number of reasons—first to show how our 'two-fuel' industry may meet competition in the field of continuous space heating of large buildings, even when considered purely on a cost basis, second to illustrate the immense value of co-operation, and last to indicate the sense of pride and satisfaction that one may achieve in one's work. I am certain that, in all of us who took part in this project, there was a deep feeling of craftsmanship and of being a member, although, maybe a humble one, of that goodly company of master masons who planned and created this lovely building.

EIGHTH DISPLAY—E.I.A.

Few of the firms that exhibited last week at the eighth display of the Engineering Industries Association had any association with, or interest for, the gas industry. The display was at the Royal Horticultural Society's New Hall, in London, S.W.1. The few firms, however, who were of interest to the industry showed some intriguing exhibits. The stand of **Harris Engineering Co., Ltd.,** in particular, is worthy of mention. They showed a working display of gas infra-red radiant heaters which incorporate the Schwank surface combustion burner. Gas is burned on the surface of highly porous refractory plates thus emitting a pure radiant heat. **King's Langley Engineering Co., Ltd.,** showed their copper tube fittings and the Kingley swaging tool, the use of which, it is claimed, can result in a perfect metal to metal joint. The flexible pipes, gaiters, and dust covers of **Creators, Ltd.,** made a most colourful and appealing show. Their products are oil-proof, strong, and durable, and are claimed to be suitable for prolonged use over a wide temperature range. **Trianco, Ltd.,** showed their new 80,000 B.Th.U. automatic solid-fuel boiler for domestic use and equipment for automatic fuel feeds and ash removal.

THE SIXTH YEAR

Gas Council Reports Reveal Sales Increase

The sixth annual reports of the Gas Council and the area boards, together with the report of the Minister of Fuel and Power, were published yesterday, October 18. The reports covered the year ending March 31, 1955. Total gas sales were 4.9% higher than the previous year, the industrial gas figure being increased by 9.3%.

The aggregate result of the area boards' operations during the year was a net surplus of £2,472,553 on a gross income of £325,280,091. This surplus, which compares with £2,111,536 for 1953-54, is after charging £18,457,944 for depreciation and £14,761,037 for interest and also after two boards had provided in total £150,000 for taxation and two boards had transferred to their revenue accounts £722,489, being provisions for taxation no longer required. Ten boards had surpluses and two deficiencies.

After making adjustments for previous years and bringing in the balances on net revenue accounts at March 31, 1954, all boards had disposable surpluses, the total of the surpluses amounting to £5,145,244. Eight boards placed a total of £975,000 to reserve funds, and three boards made transfers, totalling £453,220, to replacement and obsolescence reserves.

The report was signed by Sir Harold Smith, Chairman of the Gas Council, Mr. H. F. H. Jones, Deputy Chairman, and Mr. F. G. Brewer, Secretary. The sixth year of the gas industry under national ownership had been one of steady progress, and of substantial achievements in other directions.

With the supplies of iron, steel and other constructional materials more freely available it had been possible to proceed more satisfactorily with plans for development and integration, and the Boards were now able to provide a better service to their consumers than ever before. Sales of gas, after a slight recession in the previous year, had been the greatest in the industry's history; the demand for the other products of gasmaking had been well maintained; and the number of appliances sold had been a record. Progress had been made with investigations into sources of gas other than coal, and particularly into the gasification of oil. The Government's adoption of the main recommendations of the Beaver Committee on Air Pollution had presented the industry with a challenge and an opportunity which it had accepted with eagerness.

The report adds: 'Financially there was again a small overall surplus; but as the year drew to its close events showed the economic future in a more and more difficult light. Past increases in the price of coal had not been accompanied by any improvement in supplies, and the industry has had to eke out the coal allocated to it by the more expensive production of water gas.

Few could have thought that the coal price increase would be so great as those announced in July, 1955. Problems of the balance of payments also assumed a more serious aspect, and in February, 1955, restrictions were again imposed on hire purchase, with immediate effects on the industry's commercial activities. While the reasons for the restrictions were appreciated, the fact remained that they involved loss of revenue to the boards without a corresponding saving of costs.

The report concludes: 'All industries are subject to current economic conditions; but, however successful it may be in its search for other sources of gas, the gas industry at least for some years to come must remain dependent chiefly on coal, the supply and price of which are of fundamental importance to it. The present year cannot be other than one of anxiety to the industry. The growing demand for fuel in refined form is clear, and the gas industry is ready to play its part in meeting that demand. Its two great needs remain an adequate supply of suitable coal at a suitable price and a reasonable period of stability.'

The cumulative disposable surplus from vesting date to March 31, 1955, is £10,965,244. Of this sum £4,295,000 has been placed to reserve funds and £2,953,220 to replacement and obsolescence reserves and £3,717,024 has been carried forward.

Sales and Consumers

Gas sold during the year was 2,636.3 mill. therms, an increase of 4.9% on the previous year's total of 2,513.2 mill. therms. The increase was spread over all the main fields of consumption, the figure for industrial use being 720.0 mill. therms, an increase of 9.3% over the preceding year, while domestic sales went up from 1,347.5 mill. therms to 1,378.5 mill therms.

The average income per therm of gas sold to consumers was 16.58d. compared with 16.39d. in the previous year. The average price for domestic use was 18.67d. (credit) and 19.20d. (prepayment), for industrial use 12.27d. and for commercial use 16.51d.

Increases in costs as a result of increased coal prices and higher wages and salaries during the year under review total £7,165,000 a year. Since the close of the financial year there have been further increases estimated to amount to £25,023,000 in a full year. Although six boards were able to get through the period to March 31, 1955, without any increase in their prices, there has been no alterative but to increase the price

TABLE I.—FINANCIAL RESULTS OF EACH AREA BOARD

Board	Net Surplus or Net Deficiency (*Dr.*) for 1954/1955 before Taxation	Allocation to and from (*Cr.*) Taxation Reserves	Net Surplus or Net Deficiency (*Dr.*) for 1954/1955 after Allocation to and from Taxation Reserves	Adjustments relating to prior years	Balance at March 31, 1954 Surplus or Deficiency (*Dr.*)	Total Columns 4, 5 and 6	Placed to		Balance (Surplus) carried forward on Net Revenue Account at March 31, 1955
							Reserve Funds	Replacement and Obsolescence Reserves	
	£	£	£	£	£	£	£	£	£
SCOTTISH	388,874	—	388,874	—	*Dr.*341,568	47,306	30,000	—	17,306
NORTHERN	232	—	232	7,303	101,373	108,908	—	—	108,908
NORTH WESTERN	1,027,784	—	1,027,784	*Dr.*142,201	351,075	1,236,658	600,000	200,000	436,658
NORTH EASTERN	190,046	—	190,046	3,371	87,183	280,600	100,000	—	180,600
EAST MIDLANDS	78,220	—	78,220	—	249,978	328,198	—	178,220	149,978
WEST MIDLANDS	*Dr.*104,234	—	*Dr.*104,234	—	624,184	519,950	—	—	519,950
WALES	127,151	—	127,151	9,366	109,190	245,707	30,000	75,000	140,707
EASTERN	210,444	50,000	160,444	—	172,987	333,431	100,000	—	233,431
NORTH THAMES	*Dr.*155,568	—	*Dr.*155,568	—	720,059	564,491	—	—	564,491
SOUTH EASTERN	58,168	*Cr.*642,489	700,657	—	532,249	1,232,906	50,000	—	1,182,906
SOUTHERN	121,404	100,000	21,404	83,700	44,158	149,262	40,000	—	109,262
SOUTH WESTERN	*Dr.* 42,457	*Cr.* 80,000	37,543	—	60,284	97,827	25,000	—	72,827
	1,900,064	*Cr.*572,489	2,472,553	*Dr.* 38,461	2,711,152	5,145,244	975,000	453,220	3,717,024

of gas during the current year. The number of consumers rose by 194,914 to 12,659,732, of whom 11,920,027 were domestic consumers. The financial results of each area board are given in Table 1.

Coke and By-products

Despite reduced quantities of the coke oven being available for sale, coke sales increased during the year from 10,597,000 tons to 170,000 tons and breeze sales from 1,534,000 to 1,685,000 tons. As a result, coke stocks fell at the close of the year, to 206,000 tons, the lowest figure since 1951. Shortages of supply were mainly local, and inability to meet consumers' demands immediately was often due to transport difficulties rather than to lack of supplies.

The demand for chemical products as a whole improved during the year and greater quantities of most of them were sold. Home prices remained steady, but prices for exports to the Continent tended to fall. Disposals totalled 1,483,000 tons of crude tar, 84,000 tons of sulphate of ammonia, and 246,000 tons of spent oxide. The quantity of crude benzole extracted was 28,891,000 gal. Increased quantities of ammoniacal liquor were sold for direct application to the land as a fertilizer.

Coal and Other Sources of Gas

The coal programme originally proposed by the Minister for the summer of 1954 provided for the carbonization of 12 mill. tons during that period, but later the industry was asked to keep its consumption of coal to 11.6 mill. tons and to increase the use of oil for carburetted water gas production accordingly. The Council felt it necessary to point out that, while most boards would be able to work to the revised quantities of coal and oil, they could do so only at the cost of a serious rearrangement of their production programmes and an added charge, for the whole industry, of some £360,000. Increased production of carburetted water gas would also mean a decreased quantity of coke available for sale.

The Council was subsequently informed that the National Coal Board had been asked to increase the allocation of coal to the gas industry during the summer from 11.6 to 12 mill. tons. Deliveries fell short of the target, and, although the industry used less coal and more oil than it had anticipated using, the stock of coal at the beginning of the winter was 600,000 tons less than had been intended. Supplies of gas were maintained during the winter only with the help of imported coal and by the increased use of coke and oil. The coal used in gasmaking amounted to 27,430,000 tons, compared with 27,091,000 tons in 1953-54. In addition, 96,100 tons were used for other purposes. The average yield per ton of coal used for making coal gas was 74.8 therms, compared with 74.5 therms in the previous year. The total quantity of coal delivered to area boards during the year was 27,210,000 tons, which included 144,000 tons of imported coal.

On May 3, 1954, there was an increase in the pithead price of coal averaging for the gas industry 3s. a ton, which added another £4¼ mill. a year to its coal bill, with a corresponding increase in the cost of gas purchased from coke ovens. Since the close of the year there has been a further increase, averaging for the gas industry 12s. 6d. a ton. This increase, which took effect from July 18, 1955, will mean an additional charge of £17¼ mill. a year. The industry's bill for coal at the pithead will now be approximately £47 mill. a year more than it would have been at vesting day prices.

In seeking sources other than coal for the production of gas, special emphasis has been placed on the complete gasification of heavy oils. Five plants were at work by March 31, 1955, sixteen on order and nine under consideration. The 21 plants at work or on order are expected to save 364,000 tons of coal a year. Discussions with oil companies regarding the supply of gas from refineries are in progress and the search for natural gas continued throughout the year. An investigation is proceeding into the technical problems of transporting liquefied natural gas to Great Britain from the oilfields in areas where it is not being used.

Among subjects on which research work was carried out during the year were carbonization processes, analysis of fuel gases, complete gasification processes, production of water gas from coal, production of gas from oil, gas purification processes, coke production, the design of meters and appliances and the disposal of effluent.

New developments in convector gas fires should effect savings in gas consumption of about 25%. A new combined gas and coke fire will be in production by the end of 1955. Work on cookers has included particular study of safety aspects and the design of hotplates.

The production of water gas at 429.4 mill. therms was greater by 20% than the production in the previous year and constituted 14.9% of the total quantity of gas available. Coke and oil used for gasmaking amounted to 1,165,500 tons and 584,400 tons respectively. The charge for coke was £7.5 mill., which, on account of the increase in the cost of coal as well as the increased quantity used, was £1.2 mill. higher than the charge for 1953-54. The cost of oil, including handling, was £7.9 mill. compared with £6.6 mill. The net effect of changes in the price of oil during the year was an increase of ¼d. a gal.

The quantity of gas purchased from coke ovens was 370.3 mill. therms, or 6.3% more than in the previous year.

Of the total gas which the Wales Board had available during the year 65.3% came from coke ovens compared with 63.0% in the previous year. A joint working arrangement was made in the previous year for the Wales Board to take all available gas from the Margam works of the Steel Company of Wales, and other agreements have been concluded with the Guest Keen Iron and Steel Co., Ltd., and John Summers & Sons, Ltd., for supplies of gas for the South and North Wales Grids respectively. Since the end of the year the Board has reached agreement with the National Coal Board for the supply of coke oven gas in the area of the eastern section of the South Wales Gas Grid. The agreement is for twenty years from the date of the completion of the first stage of the National Coal Board's coke ovens at Nantgarw in September, 1951.

Of the other boards, the Northern Board obtained just over one half (51.9%) and the East Midlands Board nearly a half (47.7%) of their gas from coke ovens. For the remaining boards who purchase coke oven gas the proportion was less significant. For the whole industry the proportion of gas derived from this source was 12.8% of the total gas available.

A feature of the year, at least in some districts, has been the increase in the quantity of coke oven gas released by the use of producer gas and blast-furnace gas in place of rich gas for the firing of the ovens.

Methane from Coal Mines

The Northern Board has been taking a supply of methane from the Haig Colliery at Whitehaven since 1953. After various experiments the Board is now employing a continuous catalytic process for reforming the methane, which is then suitable for distribution as town gas. The quantity of methane taken in 1954-55 was 245,769 therms, which was sufficient to meet more than half the requirements of the Whitehaven district.

The Wales Board is installing a cyclic catalytic reforming plant of the ONIA-GEGI type used in the South of France and in Italy for reforming natural gas to deal with supplies of methane from the colliery at Point of Ayr. The Board's arrangement with the National Coal Board provides for the supply of a minimum daily quantity of 600,000 cu.ft. of methane, with a calorific value of 980 B.Th.Us. per cu.ft., and the supply, which will be used for the North Wales Grid, is expected to begin in April, 1956. Discussions are proceeding with the North Western and South Western Divisions of the National Coal Board on possible schemes for the use of methane drained

TABLE 2.—Cost of Gas

1953/1954 £m.	£m.		1954/1955 £m.	£m.
		Cost of raw materials for gasmaking (including handling):—		
115.3		Coal	122.6	
6.6		Oil	7.9	
6.2		Coke	7.5	
	128.1			138.0
	6.1	Cost of gas purchased (crude and purified)		7.0
	9.5	Process wages		9.7
	11.9	Maintenance of buildings and plant (including wages)		11.8
	15.5	Other charges (including wages)		15.8
	171.1			182.3
	67.3	*Deduct*— Income from by-products (net)		72.5
	£m.103.8			£m.109.8

retort gas, leading to a special bond of attachment between scurf and brick. The relationship could also be simply based on the frequency of scurfing, for the retorts making the highest calorific value are required to be scurfed with perhaps three times the frequency of those at the lowest calorific value.

A trial was carried out of sillimanite in an installation where severe flaking was experienced, but it was disappointing to find that the sillimanite failed very much as an earlier trial of supposedly inferior material had failed.

Reports of the freedom from flaking of French silica, made from Belgian quartzite, prompted a number of trials along with a limited trial of Silcrete, of South African origin. These comparative trials, as far as they have gone, indicate the importance of low porosity, low permeability and perhaps high mechanical strength at working temperatures. The evidence is distinctly encouraging, and no doubt manufacturers will be able to take steps to introduce these desirable properties into silica to be used in flaking zones. The French silica had a porosity of 25% and the Silcrete about 17%, so that silica to be used in flaking zones should be lower than 20% in porosity. Further trials are in progress with Silcrete and with 50% alumina material. A few pieces of electrocast material have been also introduced to provide research information in respect of material of practically zero porosity.

There is a considerable interest being devoted to the search for a non-flaking refractory material suitable for building into the affected zone of continuous vertical retorts. This would represent a notable advance for the installations where calorific value, coal and other circumstances make flaking the predominant cause of the service lives of refractories being below the average.

Siliceous material is less prone to flaking than silica, and this may be due to lower refractoriness and the formation of an impervious glaze on the surface. On the other hand siliceous material is more susceptible to attack by ferrous oxide which is released from coke by steaming reactions. By slag attack a siliceous retort may be reduced in thickness back to the tongue and groove in well under 2,000 days, with the falling out of a panel imminent.

Siliceous retorts are more susceptible to alkali attack than silica, and experience has shown that it is unwise to use siliceous material for carbonizing coals of an alkali content exceeding 0.5%, *e.g.*, many Yorkshire coals, but it is possible to use siliceous material for carbonizing coals of less alkali content than 0.25%, *e.g.*—most Durham coals.

An unusual case of alkali attack occurred in silica retorts charged with coal specially mixed with 0.5% of sodium carbonate and 1.25% of calcium carbonate in order to produce an activated coke. After 500 days on this process, the lower courses of silica showed erosion especially in the corners.

(iii) Intermittent Vertical Chambers

In the British gas industry, intermittent vertical chambers, introduced nearly 30 years ago, are now used for 7% of the coal gas output and carbonize about two million tons of coal per annum. They are rectangular chambers and have a minor axis taper to assist discharge, but this taper is much less than in the case of continuous vertical retorts. The chambers are built in silica but with top and bottom zones of fireclay to withstand thermal spalling. Usually the producers are integral with the settings and extend to the full height, but some later installations have adopted external producers. Since the system is static, the coke is discharged hot; the waste gases leave at temperatures which require a system of recuperation, which adds a complication to design which is nowadays avoided in the continuous vertical retort installation.

The installations are operated on a carbonizing period and steaming period, but the steam addition is limited in order to avoid steam erosion of the chamber bottom. Consequently they are operated in the range 525-580 B.Th.U. per cu.ft. They are normally supplied with small or run-of-mine coal. It is surprising that intermittent vertical chambers with silica material similar to that used in continuous vertical retorts, with calorific values usually higher, and possibly operated on a similar scurfing cycle, should show no appreciable flaking.

In intermittent vertical chamber installations, scurfing is either done on the basis of a small period of burn-off before each charge or by scurfing for a full charging period, perhaps every fortnight, and then with upward or downward scurfing. Spraying has been found to lead to repairs which are poor in adhesion, or which act as obstructions to dropping of charges. Airborne powder sealing is widely adopted.

Thus the intermittent vertical chamber installations have had their service life of the refractories increased to 2 00 ± 600 days due to elimination of causes of trouble in foundations, to better bracing, to detailed development of brickwork design and to improvements in operational technique and not maintenance. The scope for further improvement would appear to be in a redesign of the bottom firebrick, an improvement in its quality and in that of its jointing material and in a simplification of the structure by a separation of recuperators and producers from the chamber setting proper, in order to avoid unsymmetrical movements of the settings.

(iv) Coke Ovens

The British gas industry derives an increasing proportion of its gas from the coke oven industry (in 1953-54 it was over 12%), but the gas industry itself has relatively little experience of coke ovens. In 1912 and 1914 two batteries of coke ovens were built at Saltley gasworks, Birmingham, but when the time came to rebuild them, they were dismantled, for specialization in continuous vertical retorts had become the Birmingham policy. In 1932, the Gas Light and Coke Company at Beckton put two batteries to work each of 30 Koppers circulation compound ovens, to be followed by two more Woodall-Duckham-Koppers in 1948 and 1949, and a fifth battery is now reaching completion. In the meantime, the South Eastern Gas Board put two batteries of twenty-two Simon Carves twin-flue combination ovens at the East Greenwich works in 1950 and have followed with another in 1953 and a fourth is under construction.

The first battery at Beckton is still at work and is likely to remain so for a little longer, but the second one was shut down in 1948 not because its condition urgently demanded it but because it was planned to avoid having two simultaneous rebuildings and because it was convenient to shut down No. 2 to facilitate building of the third battery. To members of the gas industry the service life of the first battery is very impressive, although similar lives are encountered in the coke oven industry. Its life is all the more remarkable because the coal used has included a proportion of gas coal, and during the war the ovens were required to be charged by day only, which greatly interfered with the desirable regularity of operations.

Hot maintenance of the ovens has been carried out by patching vertical cracks at the end flue with sillimanite, but this has a short life and needs renewal. Several cracks (and deep spalls) adjacent to end flues have been hot-welded, but the process is slow, and cooling of the walls during welding is considered to be harmful. The brick-work around the door frames and up to the end flues has been replaced with fireclay. The original sole blocks have not been replaced. Thus the limited experience with coke ovens in the gas industry itself has been favourable, and the good service life of the refractories is similar to that realised in other coke ovens. Compared with other types of carbonizing plant it is markedly superior in this respect and is one of the factors favouring the replacement of horizontal retorts where the size of the unit is justified and the neighbourhood is industrial.

When No. 2 Battery was shut down after over 6,000 days work it was found to be in a condition which subsequent experience suggests would have enabled it to last for another seven years.

Conclusion

There has been an appreciable improvement in the service life of refractories due to improvements in refractories themselves, to increased stability of settings due to greater symmetry and simplicity of heating systems, and a greater understanding of the functions of steelwork and retort bracing.

Valuable experience is being gained in field trials of new materials and in temperature and dimensional surveys, by collaboration between constructors, operators and investigators. More trials under industrial conditions are needed, although they are expensive and necessarily slow to prove or disprove the wisdom of choice of material or design. They are an essential complement to laboratory investigations. The data being accumulated are helping towards a clearer understanding of the problems involved in attaining an extension of the service life of refractories.

TAKING STOCK*

By F. G. COX, T.D., M.Inst.Gas E.

AT intervals during the year it is a very good thing to have a mental stock-taking in the same way that, on taking a physical stock of stores, one not only counts the stores in hand but takes the opportunity to use this information as a basis for re-ordering, so one can, by a mental stock-taking, review the position, make plans and formulate a policy for the future.

To my mind, one of the salient features in 1954 was the emphasis placed on increased production, and in that year, and solely due to increased efficiency and better methods of production, it is officially estimated that there was a general increase of 5% in the industrial output of the country as a whole. I feel sure that the gas industry played its part in contributing towards this happy state of affairs—but I also feel that the same could be said of our competitors. One must always bear in mind that prosperity, like peace, must continually be paid for—Fate letting it out only on simple hire, so that there is never a final instalment. There is, in fact, no standing still—one either goes forward or backward—and while one should be encouraged by the results of the post-war years, it must be the objective of all to strive continually for better results.

We must all be aware that our competitors in the fuel services are far from being at a standstill, and one can hardly pick up any technical magazine on fuel usage without reading of further advances they have made in plant efficiency and in new fields in which their fuel is now competing with ours. It is interesting to note the increasing attention that is being given to harnessing the forces of nature to provide fresh sources of power, and it is noteworthy that in almost every case, these natural sources of energy are being used for direct conversion to electrical energy.

Although we should do well to bear these things in mind, we should at the same time appreciate the fact that, at present, the conversion of atomic energy into power for such purposes is not an economic proposition. We know for instance that in America there is a submarine powered by atomic energy but the cost of this was in the region of £19 mill. Also, it is not expected that for a few years, at any rate, the cost of producing electricity by means of atomic energy will be any less than the cost by means in use at present.

Electricity is not the only fuel competitor that is making strides towards reducing the cost of its product to the public. Notable improvements have been made by oil, especially in the industrial field, and although the efficiency of the average oil burner has increased but slightly since the war, the efficiency of an oil-fired boiler has, by improvement in design and the use of flue economizers, been increased by some 5% to 7½% until it can now be reckoned as about 75% efficiency—even when allowance is made for the preheating required by heavy oil. There is, of course, a variation in oil prices in different parts of the country but the fact that the cost per useful therm of light oil may be taken at about 9¾d. and that of heavy oil at about 8d. is something that one cannot afford to overlook. Our oil competitors have not been slow to exploit to their advantage the one asset which was for so long almost a monopoly of gaseous fuel—namely thermostatic control. Although not yet capable of adjustment within such fine limits as a gas-fired installation, an oil burning installation using light oil can now be made fully automatic.

On large installations there is, no doubt, a strong case for the use of automatic stokers and much though it may pain us to think of unprocessed coal being used for space-heating, it cannot be denied that, to a consumer whose primary object is a low cost fuel, the use of an automatic stoker operating at approximately 80% efficiency and at a cost per useful therm of about 2d. is an attractive proposition. Now, if we are to put into practice our mental stock-taking and are to review and appreciate the situation, we must follow the process through to its logical conclusion and decide what is to be done about it. It seems, broadly speaking, that our efforts must be towards one of two objectives, depending on whether we are engaged on the manufacturing side or the distribution and sales side of the industry, and these objectives are: (a) The stabilization, if not the reduction, in the price per therm available to the public, and (b) The increase in consumption per consumer. Neither of these objectives are new, but I feel that it is a good thing to bear them constantly in mind, and have them ever before us.

Stabilization of Prices

The attainment of the first objective will be largely governed by the prices that have to be paid for labour and material, but in view of recent trends, it seems that both of these commodities are more likely to increase in price, rather than decrease. There is a limit as to the extent that such increases may be held by our industry, increases which, sooner or later, may have to be passed on to the consumer. There have been many instances where, owing to increased efficiency in plant operation and savings effected by integrating small uneconomic undertakings, such increases have been borne by the industry. Once such undertakings are integrated, it cannot be expected that the remaining undertakings can increase their efficiency year by year indefinitely, so the margin for improvement must decrease accordingly. If the standard of service the public has a right to expect from us is to be maintained and improved, then there is a limit beyond which the labour employed cannot be reduced. Any reductions beyond that point would result either in inferior consumers' service, or probably increased charges due to overtime necessary to maintain the standard of service.

Research is constantly being carried out to find a cheaper raw material for processing, such as natural gas; the use of other gases such as butane; the total gasification of coal; and the conversion of petroleum products to town gas. So far results in this country have not been startling, but any major discovery which would provide us with a cheaper raw material would be of paramount importance to our industry. It is, of course, somewhat disappointing that up to the present time the Gas Council have been unsuccessful in their search for natural gas in commercial quantities, although borings in Sussex were taken to a depth almost twice that originally planned. It is understood, however, that further surveys and borings are likely to take place in Sussex and Yorkshire. The search for natural gas in this country has by no means been abandoned.

The subject of unaccounted-for gas, and the importance of reducing this figure is a matter which has formed the subject of many papers in the past. During the financial year ending March 31, 1954, unaccounted-for gas in the Eastern Gas Board's area as a whole was 6.29%. Assuming that any decrease in this figure would be reflected in the cost of manufacture, and making allowances for the value of by-products, if this figure were reduced by only 1% there would be a saving of about £40,000 in the cost of raw materials. It is realized that every undertaking may not be able to effect a reduction of 1% in its unaccounted-for figure, but, at the same time, it is felt that many of the smaller undertakings could effect reductions greater than this.

The increase in the thermal yield per ton of coal carbonized is another subject dear to the heart of the gas engineer from earliest times. In the Eastern Gas Board's area, if only one extra therm could have been obtained from each ton of coal carbonized during the financial year ending March 31, 1954, the gross saving to the Board in raw materials would have been in the order of £100,000. After allowance has been made for the value of coke, tar and other by-products this would still leave a substantial net saving of approximately £42,000. The saving effected by reducing the unaccounted-for gas figure by 1% is about the same as increasing the

* A slightly abridged version of the address presented by Mr. Cox, the new President, at the inaugural meeting of the Eastern Junior Gas Association, September 24, 1955.

total thermal yield by 1 therm per ton of coal carbonized.

There are, I feel, many improvements that could be made in the field of administration and, in our mental stock-taking, it would be as well to see what can be done in that direction, and not to jog along complacently with the same system that has been in use for many many years. I can recall the introduction of pre-paid reply cards for the use of consumers in respect of meter readings and fitting work. Prior to the introduction of this system it was not uncommon for a fitter or a meter-reader to call at a house three or four times before finding someone at home, and considering the number of homes where both husband and wife are out to work, this is not surprising. Nowadays, if the consumer is not at home on the first call a pre-paid reply card, under business licence, is left. In the case of fitting work, the consumer is asked to state on the card a date and time (with suitable notice) when it will be convenient for this work to be done, and this appointment is duly booked. Where a meter reading is required, the consumer is asked to mark on dials printed on the card the position of the indices—the card is posted, and the account rendered without further delay. Should the consumer have made an error in showing the position of the indices, then this matter is put right on the next account. I am a firm believer, also, in the use of the telephone, especially for local calls. In many cases, the call can be made at a fraction of the cost of sending a letter, when the cost of stationery, postage and typist's time are all taken into account.

Transport is another field in which possibilities for increased efficiency exist. Cases have not been unknown where the works and distribution transport worked so much apart that the men have been thought to be employed by different firms. Economies may be effected by the purchase of additional transport—for instance, an undertaking ruthlessly keeping its transport strength down, despite ever-increasing business, may well find that it is paying more for hired transport than the cost of an additional vehicle and driver, with a poorer consumers' service into the bargain. In scattered rural areas, it may well be that a parent undertaking would save money by having its own transport to take fitters to outlying districts, rather than relying on local bus or train services.

Increasing Consumption

How to increase the consumption per consumer, is to my mind, the major problem confronting the distribution and sales side of the industry today, and in tackling this problem, steps must be taken to ensure that existing consumers are retained and new ones acquired. It would, I feel, simplify matters if this problem were considered under two headings—(a) domestic consumers, and (b) industrial and commercial consumers.

Domestic Consumers

Considering that the majority of consumers are domestic (in this Board's area, the figure being about 95%) concern must be felt that the consumption per domestic consumer has recently shown a tendency to decrease, and although this decrease is numerically small, the fact that it affects the bulk of our consumers, greatly increases its significance. The greater part of the domestic load is obtained from the domestic cooker, and there is no doubt that improvements in the design and efficiency of this appliance have meant that the housewife now uses less gas on her modern cooker than before. After all, we do bring to the notice of our consumers, that, in this field, three therms of gas now do the work of five.

It has also been argued that, whereas many people hitherto have been living in overcrowded conditions, the great strides that have been made in postwar housing development have meant that fewer families are sharing the same cooking facilities, and that although the same amount of cooking undoubtedly still goes on—the net result shows a decrease in the consumption per consumer. Another factor which affects my own Area in particular is that in many homes where overcrowding existed, hot water was often supplied from a geyser, all occupants using gas for their hot baths. A great number of such people have now been re-housed in Council houses where solid fuel—usually in the form of back-boilers—provides the domestic hot water requirements, and this is a load which we have undoubtedly lost, although such grates are generally designed to burn coke and most have gas ignition.

If we are to achieve our aim we must sell more appliances, having first aroused the consumer's interest and convinced him that such and such an appliance is an absolute 'must.' The border line between what is considered an essential and what is a luxury, is a matter for each individual to decide—no two people ever agreeing completely on this. A consumer with limited means who has a gas cooker and no other means of cooking might regard his cooker as an essential and all other gas appliances as luxuries. It is up to us to convince him of the need for other appliances, and this we can do by convincing him that he, personally, will benefit by saving of time and money, safeguarding his health and improving his comfort and standard of living. Last but not least we might touch upon that strain of vanity all of us have in some degree or other—that of 'keeping up with the Joneses.' As far as existing consumers are concerned, I feel that our aim must be to maintain and increase the cooking load, and to effect sales of appliances in the fields of hot water, space-heating and refrigeration. We have recently had two most powerful aids—the lifting of restrictions on advertising and the introduction of commission schemes—let us use them to the full.

It is interesting to note that if we could induce every one of the Eastern Gas Board's domestic consumers to install even a gas poker, with an estimated annual consumption of 7 therms, the increase in gas sales would be no less than 4,711,000 therms per annum. The significance of this figure is that it represents an increase in gas sales to domestic consumers of about 6%, and an increase of about 3.7% on all gas sold during the financial year ending March 31, 1954. During the same year, the number of domestic consumers in the Board's area increased by 16,655 and taking an average figure of 116 therms each, the additional gas sales would be 1,931,980 therms. In other words, if all the Eastern Gas Board's existing consumers had had a gas poker installed (or some other appliance using 7 therms per annum) the sales of gas derived therefrom is nearly 2½ times the increase in gas sales from new consumers, and this would be accomplished without any expenditure on new mains and services, estimated at approximately £500,000.

To take this example a stage further it could be said that the maximum expenditure necessary to produce this additional amount of gas for existing consumers would be, (a) the cost of gas manufactured and purchased together with, (b) the cost of distribution and consumer service—a total cost of 13.75d. per therm. Since the average price of gas sold to domestic consumers was 20.30d. per therm, by difference, the net profit from our 'gas poker,' would be 6.55d. per therm, though it will be realized that, although this would not affect the peak load, some undertakings might have to make provision for additional storage and/or gasmaking plant. Since the figure of 13.75d. per therm includes the cost of rendering and collection of accounts, it may be assumed that no extra cost would be involved in obtaining this additional revenue from existing consumers. Subject to these assumptions, the increased profit from sales of the additional 4,711,000 therms would be £128,500. In the financial year under consideration, the Board showed a deficit of £17,322—such an increased consumption, other things being equal, would have brought about a profit of £111,178.

My own view is that it would pay us to give away a gas poker to every existing consumer who would pay us to fix it. Assuming an average net cost price for a gas poker of 5s., a write-off period of only 5 years, and an average annual depreciation of 22.7% to allow for interest charges on capital, the annual payments would be approximately £34,828. Therefore, the net profit to the Board, even when we give away a poker to every existing consumer would be £111,178 – £34,828 = £76,350 per annum. This assumes that no profit would be made out of installation charges, the loading on fixing merely covering overheads.

The industry has a wide range of modern and efficient appliances at its disposal, and obviously, appliances having a higher annual consumption if sold on such a scale, would be of even greater benefit, and would have even greater effects on the economy of our industry. Unfortunately, time does not permit me to enlarge upon the case of gas for water-heating, but when we recollect there are still over 5 mill. houses in Britain without a hot water system of any kind, it will be realized that the potential in this field is enormous. Our chances of installing additional appliances, are, of course, very much increased if we can quote, in the showrooms, a price including fixing and if our consumer already has a suitable gas point in his house. This leads us, naturally, to the

question of carcassing new houses, and the importance of providing each new house with an adequate number of gas points cannot be over-emphasized. Only constant and personal contact with architects and builders can achieve this object, and once gained, I feel that half the battle has been won in providing the additional appliances we must sell to increase our consumption per consumer. It is, of course, very tempting to endeavour to obtain as high a contribution as possible from builders to offset the capital charges of laying gas supplies to new houses, but my personal view is that, in the end, it will benefit us to have a fairly low standard charge for carcassing to a minimum of three points, with the added attraction that no additional charge is made for any additional points that are required.

Industrial and Commercial Consumers

Earlier in this address I referred to competition from other fuels, and to the form that such competition is likely to take in the future. Compared with the industrial Midlands, and the industrial North, the Eastern Gas Board, as a whole, does not rank as a heavy industrial area, yet its industrial and commercial consumers, while numerically under 5% of the total number of consumers, accounted during the last financial year, for over a third of the total gas sales. To emphasize the importance of this load still further, it could be stated that the industrial and commercial load was equivalent to the amount of gas taken by over 390,000 average domestic consumers, or that, on average, each of the industrial and commercial consumers used 1,419 therms—the same as would be used by just over 12 domestic consumers.

Every new industrial or commercial consumer could, in this light, be regarded, as the equivalent of 12 new domestic consumers, at the very least, and such a load is well worth having and increasing. In many cases, an increase of this load could be effected with little or no additional expenditure on new mains—further, in the majority of cases, the 'spread-over' consumption of industrial and commercial consumers, does not have anything like the effect on the peak load that the domestic consumption has. The non-domestic consumer is very useful and one who should, I feel, be cultivated to a much greater extent than at present. No business man is in business for pleasure—he is there for one reason only—what profit he can get out of his business. He is acutely 'cost-conscious' and is, no doubt, fully aware of what our competitors have to offer. His sales resistance is high—much higher than the average domestic consumer—and in choosing plant and equipment, he generally rates first the question of how much this will save him in hard cash.

In many cases it can be shown that, although gas may at first glance be considered more expensive than other fuels when compared on a purely thermal basis, yet the reliability, constant quality, and flexibility of our fuel, may well prove cheaper when saving in labour, risk of spoilage, installation and maintenance costs are all taken into account. Having gained our consumer, the next thing is to keep him, and increase his load. This, in my opinion, can only be effected by efficient maintenance and a 'service after sales' that is second to none. It must be obvious that this can only be accomplished if each administrative unit has an adequate staff of competent and enthusiastic industrial gas engineers who not only call upon the industrial or commercial consumer at his request, but who also have the time available to make regular calls upon him each year to check his equipment personally, to discuss with him any problems that he might have, and to keep him abreast of the times in new methods of production and new equipment. There are, of course, cases where no saving in labour can be effected, and the many other advantages of gas as a fuel cannot be used to good effect. An example of what I have in mind, is the continuous space-heating of a large building where a caretaker or stoker is necessary in any case. In such cases, where the price of gas may prove prohibitive, we should remember that we are a 'two-fuel' industry, and that coke and breeze (where available) will meet the situation.

As an illustration, I should like to mention the case of Norwich Cathedral, of which I can give a first-hand account. Until recently this beautiful and historic building was heated by a low-pressure hot water system of pipes and radiators served by three boilers having a combined rating of 2,252,700 B.Th.U. per hour—the fuel used being furnace coke. These boilers, which were nearing the end of their useful life, were fitted into a very restricted area, and the problem was to replace them by boilers which would maintain an internal temperature of 50°F. throughout the heating season, at the same time making the boilers more accessible for maintenance.

In view of the importance of this building, and the fact that other competitive fuels were being considered, notably fuel oil and the heat pump, the greatest possible care was taken in planning the new installation, and the maximum co-operation was achieved between the Board, at local level, the Area Coke Manager, the contracting heating engineer and the manufacturers. Full advantage was also taken of the valuable help freely given by the Coke Department of the Gas Council. As a result of these deliberations a scheme was eventually put forward and was accepted to replace the three old boilers by two new ones, having a combined rating of 2,296,000 B.Th.U. per hour, the boilers being fitted with Suxé firing units, and using coke breeze as fuel. The installation was made as fully automatic as possible by incorporating a time-switch and an air temperature compensator situated on the outside North wall of the Cathedral, in addition to the adjustable boiler temperature thermostat and flow water limitstat. While this work was being carried out, a new circulating pump was fitted, and considerable modifications were made to the existing pipework.

It will be appreciated that with the very limited income available to the Cathedral, it was of prime importance that both capital and running costs should be as low as possible—these aspects being even of more significance than in the case of a factory where a regular income may be expected.

The total cost of the installation was £2,375 of which £1,125 was for the installation of the Suxé units, the remainder being for new boilers which were required in any event. The case submitted by the Board to the Steward of the Dean and Chapter was that for an additional capital outlay of £1,125 the annual fuel bill could be cut from £800, with furnace coke, to about £425 with breeze, thus effecting a saving £375 per annum. Even allowing for increased depreciation, the new installation should show a net saving of about £300 per annum. This forecast was borne out in practice—the fuel bills for the two subsequent heating seasons showing a saving of £441 and £431.

I quote the installation in Norwich Cathedral for a number of reasons—first to show how our 'two-fuel' industry may meet competition in the field of continuous space heating of large buildings, even when considered purely on a cost basis, second to illustrate the immense value of co-operation, and last to indicate the sense of pride and satisfaction that one may achieve in one's work. I am certain that, in all of us who took part in this project, there was a deep feeling of craftsmanship and of being a member, although, maybe a humble one, of that goodly company of master masons who planned and created this lovely building.

EIGHTH DISPLAY—E.I.A.

Few of the firms that exhibited last week at the eighth display of the Engineering Industries Association had any association with, or interest for, the gas industry. The display was at the Royal Horticultural Society's New Hall, in London, S.W.1. The few firms, however, who were of interest to the industry showed some intriguing exhibits. The stand of **Harris Engineering Co., Ltd.**, in particular, is worthy of mention. They showed a working display of gas infra-red radiant heaters which incorporate the Schwank surface combustion burner. Gas is burned on the surface of highly porous refractory plates thus emitting a pure radiant heat. **King's Langley Engineering Co., Ltd.**, showed their copper tube fittings and the Kingley swaging tool, the use of which, it is claimed, can result in a perfect metal to metal joint. The flexible pipes, gaiters, and dust covers of **Creators, Ltd.**, made a most colourful and appealing show. Their products are oil-proof, strong, and durable, and are claimed to be suitable for prolonged use over a wide temperature range. **Trianco, Ltd.**, showed their new 80,000 B.Th.U. automatic solid-fuel boiler for domestic use and equipment for automatic fuel feeds and ash removal.

THE SIXTH YEAR

Gas Council Reports Reveal Sales Increase

The sixth annual reports of the Gas Council and the area boards, together with the report of the Minister of Fuel and Power, were published yesterday, October 18. The reports covered the year ending March 31, 1955. Total gas sales were 4.9% higher than the previous year, the industrial gas figure being increased by 9.3%.

The aggregate result of the area boards' operations during the year was a net surplus of £2,472,553 on a gross income of £325,280,091. This surplus, which compares with £2,111,536 for 1953-54, is after charging £18,457,944 for depreciation and £14,761,037 for interest and also after two boards had provided in total £150,000 for taxation and two boards had transferred to their revenue accounts £722,489, being provisions for taxation no longer required. Ten boards had surpluses and two deficiencies.

After making adjustments for previous years and bringing in the balances on net revenue accounts at March 31, 1954, all boards had disposable surpluses, the total of the surpluses amounting to £5,145,244. Eight boards placed a total of £975,000 to reserve funds, and three boards made transfers, totalling £453,220, to replacement and obsolescence reserves.

The report was signed by Sir Harold Smith, Chairman of the Gas Council, Mr. H. F. H. Jones, Deputy Chairman, and Mr. F. G. Brewer, Secretary. The sixth year of the gas industry under national ownership had been one of steady progress, and of substantial achievements in other directions.

With the supplies of iron, steel and other constructional materials more freely available it had been possible to proceed more satisfactorily with plans for development and integration, and the Boards were now able to provide a better service to their consumers than ever before. Sales of gas, after a slight recession in the previous year, had been the greatest in the industry's history; the demand for the other products of gasmaking had been well maintained; and the number of appliances sold had been a record. Progress had been made with investigations into sources of gas other than coal, and particularly into the gasification of oil. The Government's adoption of the main recommendations of the Beaver Committee on Air Pollution had presented the industry with a challenge and an opportunity which it had accepted with eagerness.

The report adds: 'Financially there was again a small overall surplus; but as the year drew to its close events showed the economic future in a more and more difficult light. Past increases in the price of coal had not been accompanied by any improvement in supplies, and the industry has had to eke out the coal allocated to it by the more expensive production of water gas.

Few could have thought that the coal price increase would be so great as those announced in July, 1955. Problems of the balance of payments also assumed a more serious aspect, and in February, 1955, restrictions were again imposed on hire purchase, with immediate effects on the industry's commercial activities. While the reasons for the restrictions were appreciated, the fact remained that they involved loss of revenue to the boards without a corresponding saving of costs.

The report concludes: 'All industries are subject to current economic conditions; but, however successful it may be in its search for other sources of gas, the gas industry at least for some years to come must remain dependent chiefly on coal, the supply and price of which are of fundamental importance to it. The present year cannot be other than one of anxiety to the industry. The growing demand for fuel in refined form is clear, and the gas industry is ready to play its part in meeting that demand. Its two great needs remain an adequate supply of suitable coal at a suitable price and a reasonable period of stability.'

The cumulative disposable surplus from vesting date to March 31, 1955, is £10,965,244. Of this sum £4,295,000 has been placed to reserve funds and £2,953,220 to replacement and obsolescence reserves and £3,717,024 has been carried forward.

Sales and Consumers

Gas sold during the year was 2,636.3 mill. therms, an increase of 4.9% on the previous year's total of 2,513.2 mill. therms. The increase was spread over all the main fields of consumption, the figure for industrial use being 720.0 mill. therms, an increase of 9.3% over the preceding year, while domestic sales went up from 1,347.5 mill. therms to 1,378.5 mill therms.

The average income per therm of gas sold to consumers was 16.58d. compared with 16.39d. in the previous year. The average price for domestic use was 18.67d. (credit) and 19.20d. (prepayment), for industrial use 12.27d. and for commercial use 16.51d.

Increases in costs as a result of increased coal prices and higher wages and salaries during the year under review total £7,165,000 a year. Since the close of the financial year there have been further increases estimated to amount to £25,023,000 in a full year. Although six boards were able to get through the period to March 31, 1955, without any increase in their prices, there has been no alterative but to increase the price

TABLE I.—FINANCIAL RESULTS OF EACH AREA BOARD

Board	Net Surplus or Net Deficiency (*Dr.*) for 1954/1955 before Taxation	Allocation to and from (*Cr.*) Taxation Reserves	Net Surplus or Net Deficiency (*Dr.*) for 1954/1955 after Allocation to and from Taxation Reserves	Adjustments relating to prior years	Balance at March 31, 1954 Surplus or Deficiency (*Dr.*)	Total Columns 4, 5 and 6	Placed to		Balance (Surplus) carried forward on Net Revenue Account at March 31, 1955
							Reserve Funds	Replacement and Obsolescence Reserves	
	£	£	£	£	£	£	£	£	£
SCOTTISH	388,874	—	388,874	—	*Dr.*341,568	47,306	30,000	—	17,306
NORTHERN	232	—	232	7,303	101,373	108,908	—	—	108,908
NORTH WESTERN	1,027,784	—	1,027,784	*Dr.*142,201	351,075	1,236,658	600,000	200,000	436,658
NORTH EASTERN	190,046	—	190,046	3,371	87,183	280,600	100,000	—	180,600
EAST MIDLANDS	78,220	—	78,220	—	249,978	328,198	—	178,220	149,978
WEST MIDLANDS	*Dr.*104,234	—	*Dr.*104,234	—	624,184	519,950	—	—	519,950
WALES	127,151	—	127,151	9,366	109,190	245,707	30,000	75,000	140,707
EASTERN	210,444	50,000	160,444	—	172,987	333,431	100,000	—	233,431
NORTH THAMES	*Dr.*155,568	—	*Dr.*155,568	—	720,059	564,491	—	—	564,491
SOUTH EASTERN	58,168	*Cr.*642,489	700,657	—	532,249	1,232,906	50,000	—	1,182,906
SOUTHERN	121,404	100,000	21,404	83,700	44,158	149,262	40,000	—	109,262
SOUTH WESTERN	*Dr.* 42,457	*Cr.* 80,000	37,543	—	60,284	97,827	25,000	—	72,827
	1,900,064	*Cr.*572,489	2,472,553	*Dr.* 38,461	2,711,152	5,145,244	975,000	453,220	3,717,024

of gas during the current year. The number of consumers rose by 194,914 to 12,669,732, of whom 11,920,027 were domestic consumers. The financial results of each area board are given in Table 1.

Coke and By-products

Despite reduced quantities of the coke made being available for sale, coke sales increased during the year from 10,597,000 to 11,170,000 tons and breeze sales from 1,534,000 to 1,685,000 tons. As a result, coke stocks fell at the close of the year, to 206,000 tons, the lowest figure since 1951. Shortages of supply were mainly local, and inability to meet consumers' demands immediately was often due to transport difficulties rather than to lack of supplies.

The demand for chemical products as a whole improved during the year and greater quantities of most of them were sold. Home prices remained steady, but prices for exports to the Continent tended to fall. Disposals totalled 1,483,000 tons of crude tar, 84,000 tons of sulphate of ammonia, and 246,100 tons of spent oxide. The quantity of crude benzole extracted was 28,891,000 gal. Increased quantities of ammoniacal liquor were sold for direct application to the land as a fertilizer.

Coal and Other Sources of Gas

The coal programme originally proposed by the Minister for the summer of 1954 provided for the carbonization of 12 mill. tons during that period, but later the industry was asked to keep its consumption of coal to 11.6 mill. tons and to increase the use of oil for carburetted water gas production accordingly. The Council felt it necessary to point out that, while most boards would be able to work to the revised quantities of coal and oil, they could do so only at the cost of a serious rearrangement of their production programmes and an added charge, for the whole industry, of some £360,000. Increased production of carburetted water gas would also mean a decreased quantity of coke available for sale.

The Council was subsequently informed that the National Coal Board had been asked to increase the allocation of coal to the gas industry during the summer from 11.6 to 12 mill. tons. Deliveries fell short of the target, and, although the industry used less coal and more oil than it had anticipated using, the stock of coal at the beginning of the winter was 600,000 tons less than had been intended. Supplies of gas were maintained during the winter only with the help of imported coal and by the increased use of coke and oil. The coal used in gasmaking amounted to 27,430,000 tons, compared with 27,091,000 tons in 1953-54. In addition, 96,100 tons were used for other purposes. The average yield per ton of coal used for making coal gas was 74.8 therms, compared with 74.5 therms in the previous year. The total quantity of coal delivered to area boards during the year was 27,210,000 tons, which included 844,000 tons of imported coal.

On May 3, 1954, there was an increase in the pithead price of coal averaging for the gas industry 3s. a ton, which added another £4¼ mill. a year to its coal bill, with a corresponding increase in the cost of gas purchased from coke ovens. Since the close of the year there has been a further increase, averaging for the gas industry 12s. 6d. a ton. This increase, which took effect from July 18, 1955, will mean an additional charge of £17¾ mill. a year. The industry's bill for coal at the pithead will now be approximately £47 mill. a year more than it would have been at vesting day prices.

In seeking sources other than coal for the production of gas, special emphasis has been placed on the complete gasification of heavy oils. Five plants were at work by March 31, 1955, sixteen on order and nine under consideration. The 21 plants at work or on order are expected to save 364,000 tons of coal a year. Discussions with oil companies regarding the supply of gas from refineries are in progress and the search for natural gas continued throughout the year. An investigation is proceeding into the technical problems of transporting liquefied natural gas to Great Britain from the oilfields in areas where it is not being used.

Among subjects on which research work was carried out during the year were carbonization processes, analysis of fuel gases, complete gasification processes, production of water gas from coal, production of gas from oil, gas purification processes, coke production, the design of meters and appliances and the disposal of effluent.

New developments in convector gas fires should effect savings in gas consumption of about 25%. A new combined gas and coke fire will be in production by the end of 1955. Work on cookers has included particular study of safety aspects and the design of hotplates.

The production of water gas at 429.4 mill. therms was greater by 20% than the production in the previous year and constituted 14.9% of the total quantity of gas available. Coke and oil used for gasmaking amounted to 1,165,500 tons and 584,400 tons respectively. The charge for coke was £7.5 mill., which, on account of the increase in the cost of coal as well as the increased quantity used, was £1.2 mill. higher than the charge for 1953-54. The cost of oil, including handling, was £7.9 mill. compared with £6.6 mill. The net effect of changes in the price of oil during the year was an increase of ¼d. a gal.

The quantity of gas purchased from coke ovens was 370.3 mill. therms, or 6.3% more than in the previous year.

Of the total gas which the Wales Board had available during the year 65.3% came from coke ovens compared with 63.0% in the previous year. A joint working arrangement was made in the previous year for the Wales Board to take all available gas from the Margam works of the Steel Company of Wales, and other agreements have been concluded with the Guest Keen Iron and Steel Co., Ltd., and John Summers & Sons, Ltd., for supplies of gas for the South and North Wales Grids respectively. Since the end of the year the Board has reached agreement with the National Coal Board for the supply of coke oven gas in the area of the eastern section of the South Wales Gas Grid. The agreement is for twenty years from the date of the completion of the first stage of the National Coal Board's coke ovens at Nantgarw in September, 1951.

Of the other boards, the Northern Board obtained just over one half (51.9%) and the East Midlands Board nearly a half (47.7%) of their gas from coke ovens. For the remaining boards who purchase coke oven gas the proportion was less significant. For the whole industry the proportion of gas derived from this source was 12.8% of the total gas available.

A feature of the year, at least in some districts, has been the increase in the quantity of coke oven gas released by the use of producer gas and blast-furnace gas in place of rich gas for the firing of the ovens.

Methane from Coal Mines

The Northern Board has been taking a supply of methane from the Haig Colliery at Whitehaven since 1953. After various experiments the Board is now employing a continuous catalytic process for reforming the methane, which is then suitable for distribution as town gas. The quantity of methane taken in 1954-55 was 245,769 therms, which was sufficient to meet more than half the requirements of the Whitehaven district.

The Wales Board is installing a cyclic catalytic reforming plant of the ONIA-GEGI type used in the South of France and in Italy for reforming natural gas to deal with supplies of methane from the colliery at Point of Ayr. The Board's arrangement with the National Coal Board provides for the supply of a minimum daily quantity of 600,000 cu.ft. of methane, with a calorific value of 980 B.Th.Us. per cu.ft., and the supply, which will be used for the North Wales Grid, is expected to begin in April, 1956. Discussions are proceeding with the North Western and South Western Divisions of the National Coal Board on possible schemes for the use of methane drained

TABLE 2.—Cost of Gas

1953/1954 £m.	£m.		1954/1955 £m.	£m.
		Cost of raw materials for gasmaking (including handling):—		
115.3		Coal	122.6	
6.6		Oil	7.9	
6.2		Coke	7.5	
	128.1			138.0
	6.1	Cost of gas purchased (crude and purified)		7.0
	9.5	Process wages		9.7
	11.9	Maintenance of buildings and plant (including wages)		11.8
	15.5	Other charges (including wages)		15.8
	171.1			182.3
		Deduct—		
	67.3	Income from by-products (net)		72.5
	£m.103.8			£m.109.8

from other coal mines in North and South Wales.

Liquefied Petroleum Gases

There was no addition during the year to the number of plants in operation for the production of gas by the mixture of air with the petroleum products butane and propane. There are four such plants —at Whitland in Carmarthenshire; at Bungay and Framlingham in East Anglia; and at St. Just in Cornwall. At all these places the continued manufacture of coal gas would have been very costly, and it would not have been economically practicable to link them with other, larger units. The plants are fulfilling their purpose in providing a satisfactory supply of gas to the small communities they serve; indeed, the Wales Board reports an increase of 13% in the demand for gas at Whitland compared with the previous year. Any addition to the number of these plants is mainly a question of economics. The Wales Board has made a review of 19 undertakings where butane/air supplies might provide an alternative to coal gas and two have been selected for further examination. In all instances the current price of butane was such as to offer little prospect of the process being economical.

Oil Gasification

In 1953-54 the quantity of gas produced by the gasification of oil was 1,924,500 therms, for which 329,200 gal. of gas, or diesel oil and 1,932,500 gal. of heavy oil, or a total of 2,261,700 gal., were used. In 1954-55 the quantity of oil gas rose to 3,920,300 therms, for which 716,800 gal. of gas oil and 3,591,600 gal. of heavy oil, a total of 4,308,400 gal., were used. The increase reflects the bringing into operation during the year of the new Onia-Gegi plant at Stafford and the Segas plant at York.

Manufacturing Plant

The total capacity of gasmaking plant has risen by 52.8 mill. cu.ft. a day, or 2.2%, during the year from 2,418.3 to 2,471.1 mill. cu.ft. a day. The approximate equivalent in therms of the latter figure is 11,808,900. The total capacity of old plant scrapped during the year was 94.1 mill. cu.ft. a day.

Though no new works have come into operation during the year, important additions to production capacity have been made at key works which have been selected for development. The largest of these is at the Beckton Works of the North Thames Board, where three new units of carburetted water gas plant, each with a capacity of 6 mill. cu.ft. a day, were brought into operation in time to contribute towards meeting the exceptionally heavy winter demand for gas.

Installations to a total capacity of 45.5 mill. cu.ft. a day which the North Thames Board had authorized or had under construction included four Onia-Gegi heavy oil plants, two units of Segas heavy oil plant, two units for the Board's own peak load oil gas process and a Gas Integrale plant which is to be erected at the Kensal Green Works. The balance of 31.5 mill. cu.ft. a day consists of four large carburetted water gas sets at Fulham and a battery of coke ovens at Beckton.

An important extension took place at the West Midlands Board's Etruria Works, Stoke-on-Trent, where an 8 mill. cu.ft. a day carbonizing plant with ancillaries was inaugurated. It enabled the Board to discontinue the use of 3.7 mill. cu.ft. a day of uneconomic plant at the works.

The Eastern Board brought into operation 10.6 mill. cu.ft. a day production capacity during the year, of which 8.3 mill. cu.ft. a day was carbonizing plant and 2.3 mill. cu.ft. a day carburetted water gas plant.

Plant developments are also mentioned of the following areas:—North Western, South Eastern, North Eastern, East Midlands, Northern, Southern, South Western, and Scottish.

Co-ordination of Gas Supplies

The savings which were forecast from the policy of integration are progressively being realized, although their full effect, and the effect of the greater efficiency of production, may sometimes be masked by increases in costs outside the boards' control. The South Eastern Board, for instance, reports a reduction in gas manufacturing costs, in spite of increases in the prices of raw materials and higher rates of wages and salaries; and the South Western Board has found that, as a result of the rise in the cost of coal, other materials and labour the savings achieved have exceeded the original estimate. The degree to which integration is practicable and economic, and the savings to be obtained from it, vary between the boards; and the fruits of integration, with the other economies which the boards have achieved, have enabled them to pass on to consumers part only of their increased costs.

The increase in the length of mains in use at the end of the year was 2,577 miles, a figure which includes mains laid for the purposes of extending and reinforcing distribution systems as well as those laid for integration. The total length of mains at March 31, 1955, was 85,991 miles.

Service to Consumers

The total number of domestic consumers rose during the year by 194,103 to 11,920,027. The overwhelming preference for cooking by gas continued. Of the 30,320 new dwellings completed in the South Eastern Area 94% were equipped with a gas supply, and of those who occupied premises where gas was available 89% chose gas for cooking. Similarly, the North Thames Board reports that 84% of the occupants of the 28,000 dwellings completed in its area chose gas cookers, and that nearly 50% of these dwellings have built-in gas lighters for their sold fuel grates.

Both during and after the war there was statutory restriction upon the amount of building which could be undertaken. Licences were required for new work, and, realising the need for extreme economy in this respect, and with the provision of adequate gas supplies as the primary concern, boards exercised special restraint in making application for licences for non-operational premises. This meant that showroom and service facilities were, and remained, totally inadequate in many places, even such centres of population as Swansea and Plymouth.

Sales of Gas

All boards had increases in sales of gas during the year, and for the industry as a whole the total gas sold rose by 5% to 2,636 mill. therms. Allowance must, of course, be made for the fact that the winter was one of more than usual length and severity, but this fact is of least effect where the development was most marked, that is to say, in supplies to industrial and commercial consumers. To the former, sales increased by 9.3% to 720 mill. therms, which represents 28% of total gas sold. Increases in industrial sales of individual boards ranged up to 12.8% and in the case of the West Midlands Board such sales amounted to 49.5% of total sales.

Another significant and welcome feature of the year's operations is that it is possible to record, for the first time since vesting day, an increase in the average annual consumption per domestic consumer. Though the influence of the weather must not be disregarded in considering this trend, it is believed that a greater proportion of new appliances is being bought for the purpose of improving standards of comfort and hygiene in the home and that the peak of the effect of the replacement of obsolete and inefficient equipment, involving a diminution in the quantity of gas required for a given purpose, may have been passed.

For the future, the establishment of smokeless zones in pursuance of the 'clean air' policy is expected to have its effect on sales of gas, coke and the appropriate appliances.

Sales of Appliances

The number of water heaters sold by the North Thames Board, 64,585, was over three times as many as in the preceding year, and the London County Council have chosen gas water heaters for 30,000 premises in which they are installing piped hot water in execution of 'Operation Rescue.' Of the rather more specialized uses, gas was chosen for 48 launderettes and 292 churches in the area, in the former for water heating and in the latter for central or radiant heating.

The numbers of main gas appliances sold for cash or on hire purchase during the year, with the corresponding figures for 1953-54, are as follows:—

TABLE 3.—APPLIANCES SOLD

Type of Appliance	Numbers sold (thousands)	
	1953/1954	1954/1955
Cookers	778.0	818.1
Space Heaters (gas)	133.9	166.2
Water Heaters	158.1	290.7
Wash Boilers	242.0	242.0
Washing Machines	17.5	47.4
Refrigerators	12.1	21.1

In the Council's Fifth Annual Report a new scheme whereby authorized dealers were to sell approved appliances was referred to.

American Gas Association Laboratories

VIGILANT in the consumers' interests, the American gas industry was one of the first in the United States to develop national standards covering the products made available to its customers and one of the first to establish a national testing agency for their application. Today, over 95% of all domestic gas appliances made in the United States undergo extensive tests for compliance with the gas industry's national standards at the American Gas Association laboratories.

The laboratories, located at 1032 East 62nd Street, Cleveland, Ohio, were established in 1925 and have grown to an organization of national recognition. They have become an integral part of the American gas industry. Their staff of experienced appliance testing and research engineers approximates 200, including the Pacific Coast Branch established in 1930 at Los Angeles, California. The laboratories administer the gas industry's Appliance Approval Plan—a programme of appliance standard preparation, appliance testing and field inspection, and is the medium through which successful, democratic, self-regulation is achieved and carried forward.

Under the Approval Plan, gas appliances are tested for safe operation, durable construction, and satisfactory performance. Manufacturers voluntarily submit a model of each unit they desire approved. Units are tested not only under normal operating conditions but also under those simulating unusual conditions that may be encountered in service. Upon completion of successful tests, manufacturers are permitted to display the laboratories' registered blue star approval seal and complete records prepared of each appliance approved. These records are used by the laboratories' field inspectors to check the manufacturers' production. Approval is granted only for the balance of the calendar year, but may be renewed by inspection. Re-tests at the laboratories, to meet the latest standards, are required every five years. All current approvals are listed in the laboratories' Directory of Approved Appliances and Listed Accessories.

The appliance standards are written by industry-wide committees of experts for each type of appliance. They report to the Approval Requirements Committee having representatives from gas utilities, manufacturers, as well as general interest groups, such as the National Board of Fire Underwriters, Federal Housing Administration, and others. The standards adopted are then submitted to the American Standards Association for adoption as 'American Standard.'

The standards are constantly reviewed and revised in keeping with the advancements of the industry and experience gained in the field. In this manner they are kept up to date and are keyed to the best current engineering practices.

In addition to the appliance testing and standards preparation programme, the laboratories perform research of a fundamental nature. They lay the foundations for practical developments by individual units of the gas industry. Projects are undertaken for the Association and guided by industry-wide committees which assign specific types of work to various research organizations embracing domestic cooking, general utilization, water heating, space heating, heating and air conditioning, and industrial and commercial applications. Over ninety bulletins and reports on these subjects have been published, and a wealth of technical information accumulated.

The East Ohio Gas Company

THE East Ohio Gas Company was organized in 1898 to market natural gas discovered in West Virginia by the Standard Oil Company (N.J.). This was one of the first projects of transmitting natural gas by long distance pipelines. In 1943 Standard Oil divested itself of its public utility holdings. At that time, the Consolidated Natural Gas Company was formed with East Ohio as one of its five subsidiary companies.

Unused, unwanted and economically unfamiliar, natural gas in West Virginia was the motive power which projected these pioneers into an untried, commercial and engineering venture, but their confidence was justified. In 1899, a year after it was incorporated, East Ohio's customers numbered 3,874. Today it is one of the largest gas companies in the United States, serving 690,000 customers, 410,613 of whom are in Greater Cleveland.

Consistent with its efforts to improve and extend service, East Ohio now brings gas to over 100 communities and boasts the third lowest rates in the country. In Cleveland, these low rates are reflected in the use of gas appliances. Of its total customers, 87% have gas ranges, 98% have gas water heaters, 8% have gas clothes dryers, 10% have gas incinerators, and 86% have gas house heating equipment.

In the U.S. Department of Agriculture's Technical Bulletin No. 1073, electric and gas energy were compared in a series of exhaustive tests. These tests were made on cooking, water heating and refrigeration. The Bulletin states that a gas range, refrigerator and water heater require 4,729,410 B.Th.U., which, in terms of East Ohio's natural gas, is equivalent to 4,504 cu.ft. East Ohio's rate is 90 cents for the first 1,000 cu.ft., and over that the rate is 60 cents per 1,000 cu.ft. This means these three services can be provided in Cleveland for $3.00 a month. The same operations under identical conditions, according to the Department of Agriculture tests, require 558 kWh of electricity. The bill for this would be $10.33.

In the industrial field, East Ohio's annual gas sales for the year ending July, 1955, amounted to $31 mill. for 65,901,617 mill. cu.ft. The same amount of heat energy would cost from $43 mill. to $51 mill. if fuel oil was used. Therefore, East Ohio saves its industrial customers $12 mill. to $20 mill. a year.

To ensure a continuous supply of natural gas, East Ohio has just completed construction of its pipeline number 12 at a cost of $10 mill. This 30-in. line will transport an additional 100 mill. cu.ft. of gas a day to East Ohio customers this winter, and larger amounts later. East Ohio's customers will demand one billion, three hundred million (1,300,000,000) cu.ft. of gas each day next winter when the mean temperature will average 0°F.

When speaking of the growth of Cleveland, one is, necessarily, speaking of the growth of East Ohio, which, since its founding in 1898, has played a vital rôle as a privately owned, tax-paying public utility, providing maximum dependable service at minimum cost.

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parties and a banquet made one's visit to New York pass all too quickly, and I am confident that we all take away many happy memories.

After a week-end in Niagara we arrived in Cleveland to find another attractive programme arranged for us, although, unfortunately, by this time our numbers had dwindled to a mere half-dozen. We first visited the showrooms of the East Ohio Gas Company where we saw much that was novel to us, including a beautifully laid-out kitchen which I was assured was typical of every American home. After lunch at a nearby restaurant where I was initiated into the rules of baseball we were given a preview of the 'do-it-yourself' exhibition. We were able to see the exhibition in the greatest comfort and even to hear over the telephone the weather reports from New York; and so to join the rest of the party for a tour of Cleveland and a dinner in the flowers before catching the next train to Chicago. Here we were invited to relax and to see the beautiful shops in this fine city, and if one so desired to visit the Tribunal Buildings and survey it from 32 storeys high. Alas! The dinner arranged by the Peoples Company for that evening was not for me as I had to leave the party to travel north. So my Managing Director and I bade farewell to our kind hosts who had provided, to the last detail, for our pleasure and comfort, also to many friends, who had with courtesy and charm accepted the company of a lone female.

My one regret is that more ladies from Great Britain could not have been with us to share this thrilling experience.

Fuel Efficiency and Clean Air

Theme of the Manchester Fuel Efficiency Exhibition

EFFICIENCY in the use of fuel means clean air. That is the theme of the Fuel Efficiency Exhibition running at City Hall, Deansgate, Manchester, until next Saturday. The exhibition, a sparkling display using the most up-to-date presentation techniques, is organized under the auspices of The Combustion Engineering Association and the National Industrial Fuel Efficiency Service.

The pace is set by the City of Manchester Health Department, which emphatically demonstrates how the use of modern gas and electricity appliances can reduce the tonnage of soot falling on the City. 'Gas and Coke for Clean Air,' claims one section. On this part of the stand are a Bratt Colbran 'Lutellо' panel gas fire; a Radiation Malmesbury hearth gas fire; a Cannon R7 gas radiator; a 'Thermlite' Main 50 radiation undergrate burner; a Radiation 'Parkray' free-standing convector; a Sugg transportable screen gasfire; and a Cannon K12 portable. Coke grates by Flavel, Newton Chambers and Radiation are also shown, together with a demonstration of the types of coke that should be used.

On the electricity section of the Health Department stand, too, there is a good selection of appliances. But why the deviation from the theme of clean air to demonstrate an electric cooker?

All the stands are admirably dressed up, with ruthless stark furniture of the new coffee-bar era—so irritating to some in house furnishing but undoubtedly without equal for the modern exhibition with its need for space economy.

Unfortunately, gas, which has not a representative stand, does not stand up very well to the opportunism of the Central Electricity Authority, who illustrate on three stands the generation of electricity by nuclear fission. There is even a nuclear reactor model. The C.E.A. deal with the contribution of pulverized fuel firing to fuel efficiency, the work of chemists in power stations, the methods of training stokers, the electrification of railways, and the use of television in boiler flame research.

And the British Electrical Development Association have two stands showing how 'Electro-heat serves industry by providing greater productivity with a reduction of production costs.'

Sir Miles Thomas, Chairman of the British Overseas Airways Corporation, opened the exhibition last week by condemning wasteful methods of producing and consuming heat, light and power.

It was certain, said Sir Miles, that the whole field of power supply would be revolutionized in a highly spectacular way when the atom had been harnessed for peaceful purposes. But the widespread application of nuclear energy was still many years off and the immediate problem was to obtain more production from the existing sources of power.

'With conditions of full employment it is not practicable to expand productive effort by increasing the labour force' he said. 'The only solution, I believe, is to give each worker more power on the job—and the only way of doing that with our present resources is by improving fuel efficiency.'

Fortunately, said Sir Miles, much effective effort was being devoted to the design and production of equipment which would help to eliminate 'the debilitating drainage of energy from the nation's sinews.' Nevertheless, the full value of such equipment could be realised only by its intensive application throughout the country.

The Minister of Fuel and Power, Mr. Geoffrey Lloyd, sent a message saying that the exhibition was on the way to becoming a regular event which showed how fuel efficiency was steadily gaining attention from industry.

One of the most eye-catching stands is that of the National Fuel Efficiency service, who screen a film they call '£20 a Ton.' Mural displays and working models illustrate examples of fuel wastage, and show how N.I.F.E.S. help the management of factories to overcome their difficulties.

The United Kingdom Atomic Energy Authority in a pleasant but not very powerful way, demonstrate the steps by which the power created in nuclear fission is to be transformed into electrity in the atomic power stations, the first of which will operate next year.

And now for a glimpse at some of the outstanding displays of manufacturers.

Airnesco Products Ltd., have an interesting stand displaying percussion lances for cleaning the gas surfaces of boiler tubes, economizers, air heaters, and similar equipment, without the need for brushes, hammers or rods. Of great interest to gas industry representatives are the bunker lances on this stand. These trim the bunkers from the outside using percussion compressed air blast. Also on show were condenser bullet guns for tube cleaning by firing bullets through the tube, using a mixture of compressed air and water.

Ashworth & Parker Ltd., emphasize the economics and utilization—for process work or space heating—of the exhaust from totally-enclosed vertical type high speed steam engines. Exhibited is a 'Parker' 10 B.H.P. non-compound back-pressure engine direct coupled to a 68 kW. Lancashire Dynamo induction generator. 'Parker' engines are suitable for driving all types of plant.

Babcock & Wilcox, Ltd., like many other of the exhibitors, have a working model, showing modern Babcock soot blowers (pneumatically, electrically, hydraulically operated). The Babcock shot-cleaning system for boiler surfaces demonstrates the importance of proper selection and use of boiler cleaning systems for improving boiler efficiency and availability. Other exhibits display Babcock-Detroit spreader stokers for efficient firing with variable, low-grade fuels, and describe cyclone firing for large boilers.

Bailey Meters and Controls, Ltd., have an instrument exhibit consisting of steam flow meters, draught gauges and temperature recording and indicating equipment and the Bailey boiler meter, which records and integrates rate of steam flow and records the equivalent air flow presenting a complete picture of boiler operation and efficiency. The smoke density measuring equipment shown operates on a constant light source and photocell receiver principle. It measures smoke density, indicating it on 8 in. edgewise scale or strip chart recorder.

Keith Blackman, Ltd., display a selection of 'Tornado' fan engineering equipment and industrial gas apparatus with special reference to their application for fuel efficiency purposes. Included are steelplate centrifugal fans and cast iron blowers, axial and propeller fans and a bifurcated type fume removal fan.

F. A. Borchardt, as sole agent for the United Kingdom, exhibits the Dutch DRUgasar balanced flue gas heaters. This heater has now become available in this country, and is a robustly constructed heater available in several sizes and designed to give convected as well as radiated heat. It is fittted with specially constructed flue equipment, so that the heating unit is completely sealed from the room which is being heated and ventilation problems are therefore said to be obviated. Also claimed for the DRUgasar are complete safety, lighting and heating control, high efficiency and long life. It requires no chimney flue and has no projection on the outside walls. Mr. Borchardt recommends it for warming premises, where the heating is intermittent in character, such as schools, offices and churches.

Donald Brown (Brownall), Ltd., who have been well-known for their non-ferrous tube and pipe fittings for over 30 years, exhibit several ranges of fittings with screwed, compression, flanged, solder and bronze welding ends for British and American hydraulic, instrumentation, lubrication, etc., applications. For instrumentation requirements in particular, a range of needle and plug valves and cocks is shown. Also displayed are the firm's new range of steel compression fittings to suit nominal bore and outside diameter steel tubes, this range being

intended for use on high pressure applications.

The Cambridge Instrument Co., Ltd., display a selection of instruments suitable for both the small and large boiler installation and includes for the former a suggested arrangement of instruments for the minimum measurements necessary including a CO_2 indicator, draught gauges of the dial and edgewise type, a pressure recorder and a multipoint pyrometer. For the larger installations a magnetic oxygen recorder together with dissolved oxygen, *p*H and conductivity recorders are shown. An electronic recorder as an alternative to these records is on view.

There is also a selection of controllers for pressure and temperature. These are suitable for gas, electrical and steam heated processes. For the plant engineer a portable CO_2 and temperature indicator and draught gauge are on exhibition.

Crosthwaite Furnaces and Scriven Machine Tools Ltd., exhibit a range of mechanical stokers including a patent gravity feed smokeless self-cleaning stoker with variable speed drive for maintaining maximum output without smoke emission. Also on show are a fixed fan forced draught grate for vertical boilers and a patent portable coal elevator for use where it is impracticable to fit fixed coal handling plant and for stacking fuel.

Edwin Danks & Co. (Oldbury) Ltd., have as their major exhibits the Oldbury chain-grate stoker for shell-type steam or hotwater boilers and the Oldbury 'Minor' chain-grate stoker for hot-water boilers. The Danks high velocity economic boiler, equipped with Oldbury stokers, is demonstrated by a scale model.

Davidson & Co., Ltd. confined their display of products to those relating to fuel efficiency. They related mostly to the Company's mechanical draught and flue dust collection equipment. A number of models were on view, demonstrating the operation and manner of installation of the 'Sirocco' cellular dust collectors, along with an appropriate selection from their range of both centrifugal and axial flow type fans. A full scale fan runner of the centrifugal backward aerofoil bladed type complete with bearings, etc., shows the aerodynamically accurate construction of their products. Of particular interest is the Company's latest type of cellular collector designed to deal with grit arresting in the smaller industrial boiler house.

New Gas-fired Boiler

Thomas De La Rue & Co., Ltd. display a cream coloured model of the 'Diplomat,' the new domestic gas-fired boiler, which is also available in scarlet, light meridian green, and white. Neat and simple in appearance, it gives an output of 44,000 B.Th.U. per hour, with a gas rate of 110 cu.ft. per hour (500 c.v. gas). The 'Diplomat' will comfortably provide heating and hot-water supply for an ordinary five-roomed house, and with an indirect system it will serve a 35-gal. cylinder, and three or four normal sized radiators. The design achieves an ease of cleaning and maintenance said to be 'unprecedented.' All the controls are concealed in the case, but are nevertheless readily accessible, being disposed immediately behind the door.

The Derbyshire Silica Firebrick Co., Ltd. contribute to the display by West's Gas Improvement Co., Ltd., and associated companies. Derbyshire Silica's exhibit comprises examples of the following refractory materials: 'Dome' insulating material, used in a variety of industries where heat conservation is important; 'Peaksil' 95% silica, used in the carbonizing, glassmaking, steel and other industries; 'Thermax,' a clay-bonded siliceous material of high density and low porosity for use in the construction of vertical retorts; 'Frisil' sillimanite material, used in the glass industry, electric, high temperature oil and gas fired furnaces, and muffles; 'DSF' siliceous materials, used in re-heating furnaces, checkers and steam boilers and in the carbonizing industries.

Electroflo Meters Co., Ltd. endeavour to express the ability of the Company to undertake the complete instrumentation and/or automatic control of all types of industrial power and processing plants, and illustrates the unusually comprehensive nature of its services to this branch of engineering. Displayed are: Indicating, integrating, recording and controlling flow meters for all fluids; measurement and/or control of pressure, temperatures, level, density or ratio of all fluids; automatic control of power and processing plants; mechanical, electrical, pneumatic or electronic methods of measurement or control; remote, supervisory control and measurement; and panels, cubicles and centralized control schemes.

Elliott Brothers (London) Ltd., give examples of flue gas analysis and temperature measuring equipment for all types of steam raising plant, including the new Elliott CO_2 transmitting analyser. Among other exhibits were a B.Th.U. meter, temperature indicators, recorders and controllers for heat treatment applications, thermo-electric, optical and total-radiation pyrometers.

Fibreglass Ltd., show by models and photographs how fuel may be saved and better conditions obtained by the insulation of factory roofs; internal and external pipes; boilers and ovens. Illustrated, also, is the insulation of offices and domestic premises—both by attic or ceiling insulation and by the protection of hot-water cylinders and their attendant pipes.

James Gordon & Co., Ltd. include on their stand Mono gas analysis recorders for CO_2, CO and H_2, also the Mono oxygen recorder. Also shown is a selection of the latest types of regulators, relays, etc., used in connection with the Hagan system of automatic control for boilers, furnaces, steam pressure reduction, desuperheating, etc., and these are in operation in order to demonstrate their various uses.

E. Green & Son Ltd., have as their main exhibit a full scale model of the type 15 high pressure 'Economizer,' demonstrating the latest method of cleaning the external heating surface. The vertical 'Economizer' model illustrates the principle of this heat recovery equipment.

Honeywell-Brown, Ltd., stress two important aspects of fuel efficiency—automatic heating control systems and furnace instrumentation. Visitors will see an outdoor compensator (or 'outside' thermostat) and an immersion thermostat linked with an electronic two-position control panel. Furnace instrumentation displayed includes an ElectroniK multi-point temperature recorder, a flow ration controller, an ElectroniK inductance bridge integrating receiver, and a differential converter.

Kelvin & Hughes (Industrial), Ltd., are displaying instruments which they market for two more main aspects of fuel economy—steam generation and process usage. The steam generation economy exhibit features typical instrumentation of a small Economic boiler and shows the application of draught gauges, flue gas analysis, multipoint temperature indication, flowmetering and recording.

George Kent, Ltd., have fully working demonstrations, including displays of the automatic control of industrial simmering, the measuring of O_2 percentage in the flue gas from a small furnace, temperature control and fuel/air ration control using Mark 20 air-operated controllers. Examples of the 'Commander' range of industrial measuring and control instruments include those for flow, temperature, specific gravity and pressure.

The Lea Recorder Co. Ltd. show examples of their V-notch type boiler feed recording apparatus, coal meters for various classes of mechanical stokers, and recording apparatus of a pattern supplied to industrial premises for measurement of trade effluents discharged to local authority sewers.

Simon-Carves Ltd., display mainly scale models and photographs illustrating the comprehensive scope of their designing, engineering and contracting service in the building of complete power plants for industry and public utilities. The exhibits cover civil engineering, water-tube boilers and ancillary equipment, flue dust electro-precipitators, fuel, ash and dust handling plants, and electrical engineering. The scale models include a complete steam and electric power plant for a large colliery coking plant.

West's Gas Improvement Co., Ltd., illustrate with their display the Company's engineering and structural work, and deal with the following aspects of fuel efficiency: The production of gas and coke, and efficient fuel handling by West's mechanical handling plant. Exhibits include illuminated flow diagram models of the Glover-West and C.O.L. systems of carbonization, a model of a Collin coke oven, a working model of West's selective screen conveyor as installed on gasworks coke plants, and a full-size Flämrich resonance screen, for coal, coke and other materials, here shown for the first time in Britain.

West's Piling & Construction Co., Ltd., display on the West's Gas Improvement stand, West's increment shell piling system, which has been widely used to support foundations for gasmaking plants, coal and coke handling plants and other heavy structures.

the stars of today

. . . are created by public acclaim. Cinema audiences acclaim demure June Thorburn, who stars in the currently released film "Touch and Go"—and housewives acclaim the Century Cooker, which features in thousands of modern kitchens throughout the British Isles.

The roles of these two stars in contemporary life are in widely differing fields, but the pre-eminence of both is the result of their fulfilling the exacting demands of their respective roles.

Star features of the Century

★ Vitreous enamelled surfaces throughout ★ Cream exterior ★ Removable double platerack ★ Used oven heat vented in front of backplate to heat platerack ★ Four fast-boiling hotplate burners with taps having fixed stop for simmering ★ Large quick-heating grill ★ Safety-type taps ★ Hotplate parts removable ★ Roomy oven, base suitable for slow cooking ★ Mainstat oven-heat control ★ Drop-type oven door ★ Oven lights from front by flash tube ★ Storage space in plinth ★ Hotplate side extensions and gas lighter supplied if required

R. & A. MAIN LIMITED
LONDON & FALKIRK

June Thorburn who stars with Jack Hawkins and Margaret Johnston in 'Touch and Go' (an Ealing Studios Production).

C.60

The MAIN No. 20

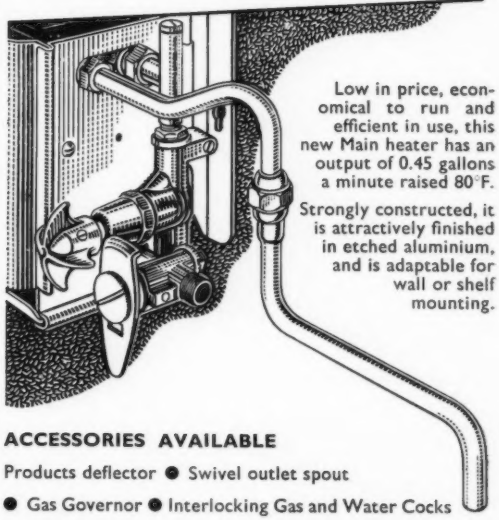
CENTURY Cooker

Note the name-made by MAIN

C.60

the NEW water heater for single-point duty . . .

the MAIN MINIMAIN instantaneous GAS WATER HEATER



Low in price, economical to run and efficient in use, this new Main heater has an output of 0.45 gallons a minute raised 80°F.

Strongly constructed, it is attractively finished in etched aluminium, and is adaptable for wall or shelf mounting.

ACCESSORIES AVAILABLE

Products deflector ● Swivel outlet spout ● Gas Governor ● Interlocking Gas and Water Cocks complete with gas and water throttles and pilot light

low priced to meet popular demand

MAIN WATER HEATERS LTD.

Gothic Works, Thornton Road, Croydon, Surrey

W 34

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Electricity Cheaper ?

The Town Council of Burntisland (Fife) has decided that street lighting in certain areas of the town should be converted from gas to electricity. It was stated that, on the present scale of charges, the cost of a 100 W. electric lamp operating from sunset till midnight was about £1 4s. 4d. per annum, as against £4 for the same period in respect of a two-mantled gas lamp. An all-night electric lamp involved expenditure of £1 19s., compared with £9 16s. for a gas lamp. The Hon. Treasurer said that the difference between the two systems was amazing. Actual expenditure during 1954 to 1955 in respect of gas for street lamps was £1,494 as against £250 for electricity, although gas lamps only outnumbered electric lamps by nine. The cost of a gas standard was also greater than that of an electric standard.

Cleaner Air in Edinburgh

To ensure clean air is as much the task of the citizens as the industrialist, says Mr. J. F. Anderson, Edinburgh's Chief Sanitary Inspector, in his annual report. He adds that in facing up to its responsibility in this matter the Corporation had given practical evidence of its earnestness to contribute to a healthier atmosphere by embarking upon a three-year programme of fitting automatic stokers to furnaces in markets, baths, and washhouses. Although the question had yet to be finally resolved, the establishment of a smokeless zone had been approved in principle meantime. The real obstacle to its accomplishment was the prevention of domestic smoke. Special fuel supplies, gas ignition, and the installation of approved fire grates enter into the problem. These requirements had to be capable of fulfilment in order to achieve success.

In other cities, central business areas free from domestic dwellings or estates of new houses had proved themselves to be appropriate subjects for the establishment of smokeless zones.

Gas at the Bakers' Service

A corner of the reel oven with its separate high efficiency coke burner and an Ewart water heater on the right, which were situated behind the counter of the Gas Council's shop, 'The Ivory Oven.'

One of Essard's gas-fired ovens: a life-like model of the Maitre Chef of the Kensington Palace Hotel where these ovens are installed, stands by it.

The 44th Bakers' and Confectioners' Exhibition was held at Olympia from October 1 to 6. Many well-known manufacturers of industrial gas ovens were exhibiting. The Gas Council stand was designed to illustrate that the small baker could benefit considerably from the policy of cooking in front of the public. The Council illustrated this by building the stand as a baker's shop called 'The Ivory Oven' with a batch operated reel oven fired by a new type of high efficiency coke burner by Cox Ovenbuilders, Ltd., a member of the Flavel Group, behind the counter.

Also on the stand was a Ewart water heater for supply of hot water in fondant and doughnut manufacture.

Charles Portway & Sons, Ltd., showed their latest portable gas ovens and Essard Ltd., exhibited a range of gas fired ovens for both town and bottled gas fitted with flame-failure safety devices.

LONG SERVICE PRESENTATIONS

★

Thirty Years with George Wilson

Left. Mr. W. D. Wilson, the Chairman of George Wilson Gas Meters Ltd., presented Mr. G. C. Ball with a cheque, a gold wristlet watch, a pipe and tobacco and a nest of tables, on his retirement. Mr. Ball, who is 74, has been with the company for 30 years.

Over Forty Years in the Gas Industry

At the Gas Offices of the Wales Gas Board in Merthyr Tydfil on October 7, Long Service Certificates were presented to four employees of the Merthyr Tydfil Gas Undertaking who had all been engaged continuously for over 40 years in the gas industry.

The framed certificates, which had been personally signed by both the Chairman and Deputy Chairman of the Board, were handed over at a special meeting of the Joint Staff and Joint Manual Consultative Committee by Mr. D. E. West, M.INST.G.E., General Manager of the Undertaking, who is seen with the four employees in the accompanying illustration. The recipients were:—Mr. Mathew Edwards, Chief Clerk; Mr. Wm. John Small, Mains Foreman; Mr. Dan. G. Todd, Assistant District Superintendent; and Mr. George Wall, Retort Setter and Brick Layer.

ASCOT SHOWCARD

A special showcard designed in connection with the Commercial Television programme 'A Girl with a Date' in which the Ascot RS 25/1 boiling water heater was featured on October 11.

Modern Homes Exhibition

Ascot Gas Water Heaters Ltd. had an outstanding gas display on their stand at this year's Modern Homes Exhibition in the Kelvin Hall, Glasgow. Main feature of the stand is a miniature tea bar at which Ascot dispensed a free cup of tea.

The Scottish Gas Board, nearby, had a very fine stand this year, with red and black the main colours. This stand stressed various aspects of gas application, aimed essentially at the domestic market and with sections covering various ranges. Slogans used all hammered home these applications including 'Gas for Heat', 'Gas for Perfect Cooking', 'Gas for Health'—There was a steady stream of visitors throughout the Show and results were reported to be most satisfactory.

Opening an exhibition of gas appliances at Forres, organized by the Scottish Gas Board, Provost R. B. S. Braid commended healthy competition between the gas and electricity industries as a prevention against monopolies.

Aberdeen Tenants Lose Free Cookers

A move by the finance committee to discontinue supplying gas or electric cookers to tenants of municipal houses —a practice which is estimated to cost the Corporation at least £10,000 a year —was narrowly defeated at a meeting of Aberdeen Town Council last week. An amendment by Treas. G. R. McIntosh that there should be no change in present procedure was carried by 15 votes to 12. The committee recommended that (a) the supply of gas or electric cookers be discontinued from November 28; (b) the city chamberlain report on a scheme for the sale of existing cookers to tenants, (c) the Corporation continue to wire and pipe all new municipal houses for electricity and gas; and (d) the city architect to report on the advisability of the Corporation continuing to supply washboilers in municipal houses.

The Ministry of Industry and Commerce has given permission to Larne Gas Company, Ltd., to increase its charges by 1s. 6d. per 1,000 cu.ft.

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The New Zealand Government's concern about the future of the gas industry was emphasized in a statement by the Minister in charge of the State Hydro-electric Department, Mr. W. S. Goosman. He said the Government was looking for an acceptable way in which the gas industry could be stabilized and expanded, because the country needed all the heat, light and power it could produce. The gas industry at the moment was providing nearly one-seventh of the total power produced. Throughout the country, 200,000 consumers depend upon gas for cooking, water-heating or space-heating. The Government already pays a subsidy of 2s. for each thousand cu.ft. of gas sold, and has made loans to different gas-works to enable them to operate efficiently. During the last financial year, this subsidy had amounted to £1½ mill. and interest-free loans to just on £140,000.

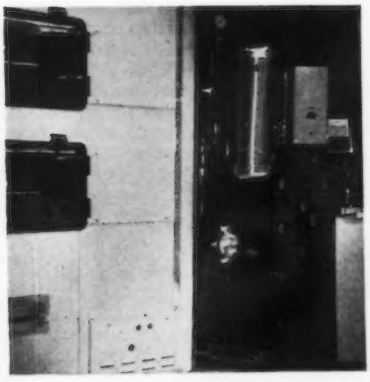
Electricity Cheaper ?

The Town Council of Burntisland (Fife) has decided that street lighting in certain areas of the town should be converted from gas to electricity. It was stated that, on the present scale of charges, the cost of a 100 W. electric lamp operating from sunset till midnight was about £1 4s. 4d. per annum, as against £4 for the same period in respect of a two-mantled gas lamp. An all-night electric lamp involved expenditure of £1 19s., compared with £9 16s. for a gas lamp. The Hon. Treasurer said that the difference between the two systems was amazing. Actual expenditure during 1954 to 1955 in respect of gas for street lamps was £1,494 as against £250 for electricity, although gas lamps only outnumbered electric lamps by nine. The cost of a gas standard was also greater than that of an electric standard.

Cleaner Air in Edinburgh

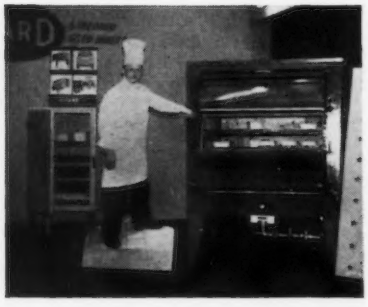
To ensure clean air is as much the task of the citizens as the industrialist, says Mr. J. F. Anderson, Edinburgh's Chief Sanitary Inspector, in his annual report. He adds that in facing up to its responsibility in this matter the Corporation had given practical evidence of its earnestness to contribute to a healthier atmosphere by embarking upon a three-year programme of fitting automatic stokers to furnaces in markets, baths, and washhouses. Although the question had yet to be finally resolved, the establishment of a smokeless zone had been approved in principle meantime. The real obstacle to its accomplishment was the prevention of domestic smoke. Special fuel supplies, gas ignition, and the installation of approved fire grates enter into the problem. These requirements had to be capable of fulfilment in order to achieve success.

In other cities, central business areas free from domestic dwellings or estates of new houses had proved themselves to be appropriate subjects for the establishment of smokeless zones.



A corner of the reel oven with its separate high efficiency coke burner and an Ewart water heater on the right, which were situated behind the counter of the Gas Council's shop, 'The Ivory Oven.'

Gas at the Bakers' Service



One of Essard's gas-fired ovens; a life-like model of the Maitre Chef of the Kensington Palace Hotel where these ovens are installed, stands by it.

The 44th Bakers' and Confectioners' Exhibition was held at Olympia from October 1 to 6. Many well-known manufacturers of industrial gas ovens were exhibiting. The Gas Council stand was designed to illustrate that the small baker could benefit considerably from the policy of cooking in front of the public. The Council illustrated this by building the stand as a baker's shop called 'The Ivory Oven' with a batch operated reel oven fired by a new type of high efficiency coke burner by Cox Ovenbuilders, Ltd., a member of the Flavel Group, behind the counter.

Also on the stand was a Ewart water heater for supply of hot water in fondant and doughnut manufacture.

Charles Portway & Sons, Ltd., showed their latest portable gas ovens and Essard Ltd., exhibited a range of gas fired ovens for both town and bottled gas fitted with flame-failure safety devices.

LONG SERVICE PRESENTATIONS

★

Thirty Years with George Wilson

Left. Mr. W. D. Wilson, the Chairman of George Wilson Gas Meters Ltd., presented Mr. G. C. Ball with a cheque, a gold wristlet watch, a pipe and tobacco and a nest of tables, on his retirement. Mr. Ball, who is 74, has been with the company for 30 years.

Over Forty Years in the Gas Industry

At the Gas Offices of the Wales Gas Board in Merthyr Tydfil on October 7, Long Service Certificates were presented to four employees of the Merthyr Tydfil Gas Undertaking who had all been engaged continuously for over 40 years in the gas industry.

The framed certificates, which had been personally signed by both the Chairman and Deputy Chairman of the Board, were handed over at a special meeting of the Joint Staff and Joint Manual Consultative Committee by Mr. D. E. West, M.INST.G.E., General Manager of the Undertaking, who is seen with the four employees in the accompanying illustration. The recipients were:—Mr. Mathew Edwards, Chief Clerk; Mr. Wm. John Small, Mains Foreman; Mr. Dan. G. Todd, Assistant District Superintendent; and Mr. George Wall, Retort Setter and Brick Layer.

ASCOT SHOWCARD

A special showcard designed in connection with the Commercial Television programme 'A Girl with a Date' in which the Ascot RS 25/1 boiling water heater was featured on October 11.

Modern Homes Exhibition

Ascot Gas Water Heaters Ltd. had an outstanding gas display on their stand at this year's Modern Homes Exhibition in the Kelvin Hall, Glasgow. Main feature of the stand is a miniature tea bar at which Ascot dispensed a free cup of tea.

The Scottish Gas Board, nearby, had a very fine stand this year, with red and black the main colours. This stand stressed various aspects of gas application, aimed essentially at the domestic market and with sections covering various ranges. Slogans used all hammered home these applications including 'Gas for Heat', 'Gas for Perfect Cooking', 'Gas for Health'—There was a steady stream of visitors throughout the Show and results were reported to be most satisfactory.

Opening an exhibition of gas appliances at Forres, organized by the Scottish Gas Board, Provost R. B. S. Braid commended healthy competition between the gas and electricity industries as a prevention against monopolies.

Aberdeen Tenants Lose Free Cookers

A move by the finance committee to discontinue supplying gas or electric cookers to tenants of municipal houses —a practice which is estimated to cost the Corporation at least £10,000 a year —was narrowly defeated at a meeting of Aberdeen Town Council last week. An amendment by Treas. G. R. McIntosh that there should be no change in present procedure was carried by 15 votes to 12. The committee recommended that (a) the supply of gas or electric cookers be discontinued from November 28; (b) the city chamberlain report on a scheme for the sale of existing cookers to tenants, (c) the Corporation continue to wire and pipe all new municipal houses for electricity and gas; and (d) the city architect to report on the advisability of the Corporation continuing to supply washboilers in municipal houses.

The Ministry of Industry and Commerce has given permission to Larne Gas Company, Ltd., to increase its charges by 1s. 6d. per 1,000 cu.ft.

'BRIDE OF THE YEAR': AREA FINALS

Mrs. K. M. Collett of Tynemouth, winner of the Northern Area Final, photographed in her kitchen. Her appliances included a Century cooker, by R. & A. Main Ltd., and an Aintree water heater.

Northern

After successfully emerging through the preliminary stages of the National 'Bride of the Year' Competition eight finalists representing the various Divisional Areas of the Northern Board competed at Darlington on September 28 for the title of the Northern Board's 'Bride of the Year.' In gaily coloured and delightfully planned kitchens the 'Brides' vied with each other for the honour of representing the North at the Festival Hall in November. The event was staged before an audience of 450 visitors representing the most important women's organisations and included Civil Officials from Local Authorities from the various centres within the Board's area. The platform party consisted of Mr. E. Crowther, Chairman, Mr. A. S. Middleton, Commercial Officer accompanied by the Mayor and Mayoress of Darlington.

Additional interest was provided by mannequin presentations of feminine woollen wear. The winner of the Competition was Mrs. K. M. Collett, of Tynemouth, Northumberland.

North Eastern

Mrs. P. Bastow, of Harrogate, a nursing sister and the wife of an architect, was declared the winner at the Area Final of the 'Bride of the Year' Competition on October 6. The North-Eastern Gas Board provided an interesting and attractive afternoon, at the Royal Hall, Harrogate. The attendance was good, consisting of deputations from the Women's Gas Federations branches throughout the Area.

Mr. A. McDonald (Full time Member of the Board) introduced the programme and the competitors whereupon they set to work on the stage. The staggered ranks of cookers and kitchen tables and the earnest application of the contestants provided a pleasant sight in the surroundings of the Hall. At the end of the cookery test there was a dress show by one of Harrogate's leading shops which gave the judges a chance to complete their work. Miss Glen, Principal of the Ilkeley College of Housecraft, and Miss Grimwade, her Senior Cookery Lecturer, moved round sampling the dishes. Miss Glen in a few words after the presentation said she was impressed by the calm and efficient way the competitors went about their work in the strange surroundings.

Mr. McDonald then introduced the Mayoress of Harrogate, Mrs. R. J. Riley, who presented the prizes. First prize to Mrs. P. Bastow of Harrogate, second to Mrs. E. M. Carr of Bradford and third to Mrs. C. Howson of Garforth. Consolation prizes were presented to the other contestants. Mrs. N. Sturrock then presented copies of the "Happy Home" to the judges in appreciation of their work.

In conclusion Mr. Norman Hudson (Chief Commercial Officer, North Eastern Gas Board) gave a vote of thanks to all who had assisted in the success of the day in particular members of the York-Harrogate Group, and to his own staff.

South Eastern

The South Eastern Gas Board held their area final of the competition to find 'Mr. Therm's Bride of the Year,' in the restaurant of Bentall's Ltd., Kingston-on-Thames, on October 5. A small display of cookers finished in different colour combinations was arranged with a simple competition to discover which colours were the most favoured. Grey and burgundy was first in popularity with green and cream second.

Mrs. Mair Jones, Chief Homes Service Adviser to the South Eastern Gas Board, opened proceedings by welcoming the guests and the eight competitors in the Area Final. She invited the 'Brides' to the platform and gave information about each and then invited their husbands to come up with them.

The Deputy Chairman of the Board, Mr. R. S. Johnson, introduced the judges, Mrs. Hilda Whitlow, Editress of women's features for Victoria Publications, Miss E. D. Blackmore, Senior Inspector of Housecraft to the London County Council, and Mrs. Iris Syrett, Principal of the Tante Marie School of French Cuisine, Woking.

Miss Blackmore said she was very impressed with the work of the 'Brides' in a difficult competition, especially with unfamiliar equipment.

Mrs. R. S. Johnson, wife of the Deputy Chairman presented the prizes to three domestic science teachers, who appropriately enough, took the first three places. Mrs. M. Laughton of Crowborough, Sussex, took first place, with Mrs. B. E. Gibson of Beckenham, Kent, second, and Mrs. A. L. Philip of Brighton, Sussex, third. Mrs. Laughton used a Vulcan Devon 8 cooker, and Electrolux L.230 Cooker and a Flavel National sink water heater.

The eight finalists for the South Eastern Gas Board's title who competed to represent the South Eastern area in the National finals. From left to right are: Mrs. M. Milton, Mrs. B. E. Gibson (second prize), Mrs. B. Winter, Mrs. I. Preddy, Mrs. M. Baldwin, Mrs. A. L. Philip (third prize), Mrs. C. J. Claridge, and Mrs. M. Laughton (first prize).

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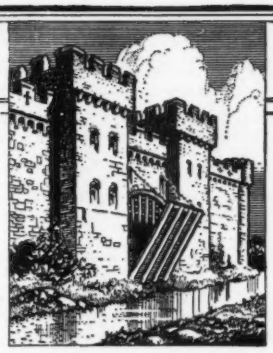

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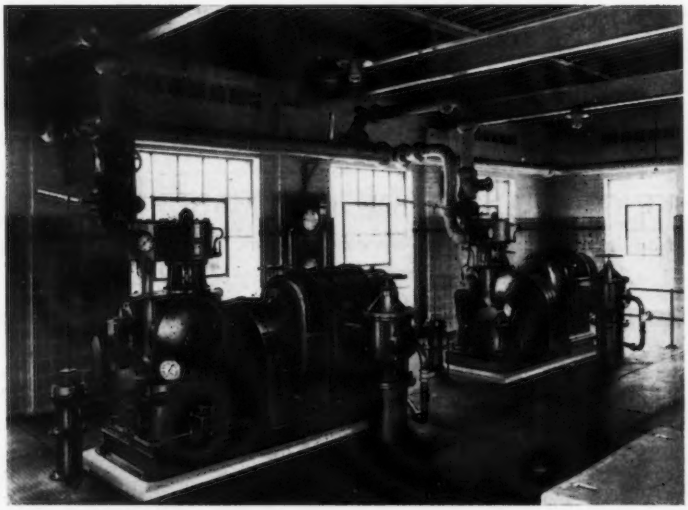

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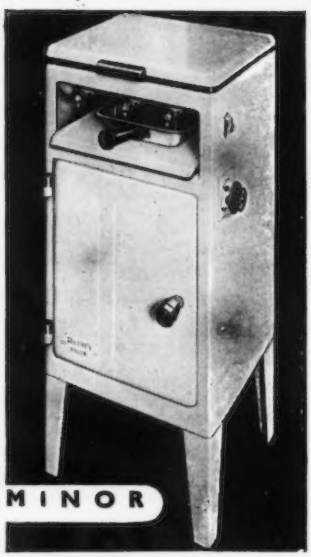
BIG Capacity for LITTLE Kitchens



Especially suited to the kitchens of flats and small houses, this highly efficient cooker provides utmost cooking capacity in the least possible space. Cast iron construction ensures strength and durability and reduces maintenance costs to a minimum, thus making the Dainty Minor particularly suitable for simple hire or hire purchase.

Approved and adopted by leading gas boards

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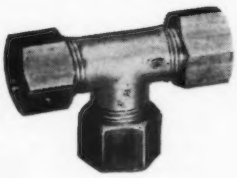

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WALTER KING, LTD. 11, BOLT COURT, FLEET STREET, LONDON, E.C.4

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Classified Advertisements: All small classified advertisements are charged at **2/-** per line (approx. **7** words)—minimum charge **10/-**. A Box Number address occupies **2** lines, and a further **6d.** is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

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FOR SALE: NEW GAS-FIRED BOILER by Hartley & Sugden. 160 lbs./hour at 80 lbs. p.s.i., complete with chimney, spare burner and controls. Original purchase price was £419. Our price £200. W. H. COLLINGBOURNE & CO., LTD., 1481, Stratford Road, Birmingham, 28. Phone: Shirley 3303.

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APPOINTMENT WANTED

INDUSTRIAL Heating Engineer desires change. At present with an Undertaking making approximately 4,000 million with a good industrial load. Fifteen years' experience in all types of industrial work and conversant with oil firing. Apply No. 259, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive or a woman aged* 18-59 *inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order*, 1952.

SCOTTISH GAS BOARD

LANARKSHIRE DIVISION
STATION ENGINEER AT MOTHERWELL GAS WORKS

APPLICATIONS are invited for the appointment of STATION ENGINEER at Motherwell Gas Works.

The successful applicant will be responsible to the Divisional Production Engineer for the production of gas and residual products and maintenance of the carbonising and ancillary plant at the Motherwell Production Station of the Lanarkshire Division.

The appointment carries a salary of Provincial A A.P.T. 10 (£760-£860), with placing according to qualifications and experience.

Candidates should be Corporate Members of the Institution of Gas Engineers, and should be fully experienced in the control of modern Gas Works plant.

Applications endorsed " Station Engineer, Motherwell," giving the names of two referees and full particulars of educational training and experience should reach the undersigned not later than Tuesday, November 1, 1955.

JAMES M. DOW,
Divisional Controller.

Divisional Offices,
Bothwell Road,
Uddingston.
October 11, 1955.

SCOTTISH GAS BOARD

DUMBARTON/HELENSBURGH DISTRICT
WORKS SUPERINTENDENT, HELENSBURGH

APPLICATIONS are invited from suitably qualified Gas Engineers for the position of WORKS SUPERINTENDENT, Helensburgh. Candidates should preferably have practical experience of the control and operation of Glover-West Vertical Retorts and automatic C.W.G. plants and be capable of supervising the general operation of the works, which produces 260 million cubic feet of gas per annum.

The salary will be within Grade 6 (£565-£645 per annum) of the National Salary Scales for Gas Staffs.

A new bungalow, situated in the residential area of Helensburgh, is available at a rent of £37 per annum.

Applications, stating age and particulars of training, experience and qualifications, should reach the undersigned not later than Monday, October 24.

ALEXANDER MCFADYEN,
Engineer and Manager.

Gas Works,
Dumbarton,
October 7, 1955.

WEST MIDLANDS GAS BOARD

REDDITCH DISTRICT
FIRST CLASS GASFITTER

A VACANCY exists for a FIRST GLASS GAS-FITTER to be stationed at Studley, Warwickshire. Applicants should be experienced in the installation and maintenance of modern gas appliances and a knowledge of high pressure governors would be an advantage.

A six-roomed house is available at a reasonable rent.

The rates of pay and conditions of employment will be in accordance with J.I.C. Agreements.

Applications stating age and experience to Mr. J. Bates, Group Engineer and Manager, West Midlands Gas Board, Gas Works, Redditch.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WALSALL AND DISTRICT DIVISION.
DRAUGHTSMAN,
DIVISIONAL DISTRIBUTING ENGINEER'S DEPARTMENT, OLDBURY.

CANDIDATES should have experience in the design of light steel structures and be capable of preparing general arrangement and detailed drawings of cast iron and mild steel pipe connections. Possession of the Higher National Certificate in Mechanical Engineering would be an advantage.

The commencing salary will be within the range of Grade A.P.T. 7 (£620-£700 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. F. Harvey, Divisional General Manager, West Midlands Gas Board, Walsall and District Division, Walsall Factory Estate, Tame Bridge, West Bromwich Road, Walsall, to reach him by not later than October 31, 1955.

J. C. INGRAM,
Secretary to the Board.

(*Classified advertisements continued on page* 222)

WALTER KING PHOTOGRAPHS

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APPOINTMENTS VACANT (*ctd.*)

APPLICATIONS are invited for the appointment of senior and intermediate DRAUGHTSMEN on the permanent staff of a firm of industrial pipework contractors in North West London. Salaries up to £800 per annum will be paid to men with suitable qualifications and experience. Applications stating age, education, training and experience should be addressed to No. 258, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

SOUTHERN GAS BOARD

PURCHASING OFFICER

APPLICATIONS are invited from suitably qualified persons for the appointment of PURCHASING OFFICER in the Commercial Manager's Department of the Board at a commencing salary of £1,400 per annum.

Applicants should have a sound experience of purchasing materials and equipment, preferably as used in the Gas Industry. They should also be experienced in the scrutiny of tenders and contracts.

The successful candidate will be required to co-ordinate purchasing throughout the Board and to negotiate centrally contracts for the supply of materials and equipment.

He will be required to pass a medical examination and, unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required to join the Board's Staff Pension Scheme.

Applications stating age, education, qualifications, training, experience, present appointment and salary, together with a one-page summary of these particulars, should be sent in an envelope marked "Purchasing Officer" to the Secretary, Southern Gas Board, 164, Above Bar, Southampton, to reach him not later than November 12, 1955.

DRAUGHTSMAN age about 35 with shop experience required as Assistant to Chief Draughtsman. West Country works. Knowledge of Compressors and Fans an advantage. Bonus and pension schemes.—Apply No. 257, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

NORTH THAMES GAS BOARD

A CHEMICAL ENGINEER is required to work on the personal staff of the Chief Engineer based at Westminster. Applicants, who should be between 30 and 40 years of age, should possess a degree in chemical engineering or similar qualifications. Duties will include development work, particularly in relation to new and improved methods of production, refining and distribution of gas from gaseous and liquid hydrocarbons and coal.

Initial salary will be commensurate with age, experience and qualifications, and will not be less than £1,000 per annum.

The post, which is pensionable, has good promotional prospects.

Applications stating age and giving full details of qualifications and experience should be sent to Staff Controller, North Thames Gas Board, 30, Kensington Church Street, W.8, quoting reference 666/282.

WALES GAS BOARD

NEWPORT UNDERTAKING

APPLICATIONS are invited for the appointment of DEPUTY GENERAL MANAGER and Engineer to the Newport Undertaking.

The applicant must have a sound knowledge of modern distribution practice and of the Management and Administration of a Gas Undertaking.

The Newport Undertaking is supplied with crude coke oven gas, also with gas from the Board's Grid system, and to meet peak load demands Carburetted Water Gas is manufactured. Ability to control purification and peak load plants is necessary. Appropriate technical qualifications are essential.

The commencing salary will be £1,150 per annum. The post is pensionable.

The successful applicant will be required to pass a medical examination.

Applications giving details of age, qualifications, experience and present position, together with the names of two referees, should reach the undersigned not later than October 31, 1955.

C. B. MAWER,
Secretary

2, Windsor Place,
Cardiff.

EAST MIDLANDS GAS BOARD

NOTTS. & DERBY DIVISION
GAS ENGINEERING DRAUGHTSMAN

A VACANCY exists for a GAS ENGINEERING DRAUGHTSMAN in the Divisional Drawing Office, Friar Gate, Derby.

Applicants should be experienced in the design, layout and detailing of either one or more of the following: Plant layout, pipe layouts, steel structures.

The commencing salary will be within the range of A.P.T. 7 (£620/£700) according to age, qualifications and experience.

The position is pensionable, and the successful applicant will be required to pass a medical examination.

Applications stating age, present position and experience, together with the names of two referees, should be addressed to the undersigned not later than Friday, October 28, 1955.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts. and Derby Division,
P.O. Box No. 62,
Friar Gate,
Derby.

NORTHERN GAS BOARD

WESTERN GROUP.
DISTRIBUTION SUPERINTENDENT—WORKINGTON DIVISION.

APPLICATIONS are invited for the positi DISTRIBUTION SUPERINTENDENT, ington Division. Salary within Grade A.P.T. 9 £800 per annum) of the National Joint Coun Gas Staffs. A house to rent will shortly be ava

Applicants should have (a) a thorough kno of modern methods of distribution, including and low pressure systems, (b) experience o fitting, including installation and maintenanc modern gas appliances, and (c) be capable of ing out detail work in connection with plannin estimating of new work.

The successful candidate will be required to pa a medical examination and join the Board's Pe Scheme.

Applications, stating age, experience and givin details of training and qualifications, together wi names of two referees should be addressed to th Group Chief Engineer, Gas Works, Workin Cumberland, to arrive not later than Satu November 5, 1955.

R. & J. DEMPSTER LTD.

SENIOR DRAUGHTSMAN

Excellent opportunity occurs for Senior Draughtsman with H.N.C. qualification. Duties will include the control of junior draughtsmen and taking out schedule of materials, etc. Experience in pressure vessels would be an advantage.

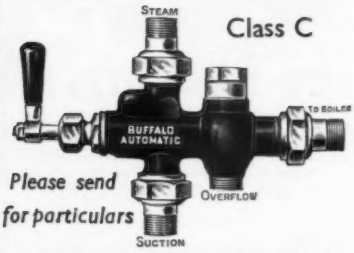
The position is a responsible one and will carry an appropriate salary. Pension scheme in operation.

If necessary, the question of accommodation is one which could be discussed with the successful applicant.

Applications, which will be treated in the strictest confidence, should give full particulars of age, education and experience and should be addressed to:

The Secretary,
GAS PLANT WORKS,
MANCHESTER 10.

BUFFALO INJECTORS



Please send for particulars

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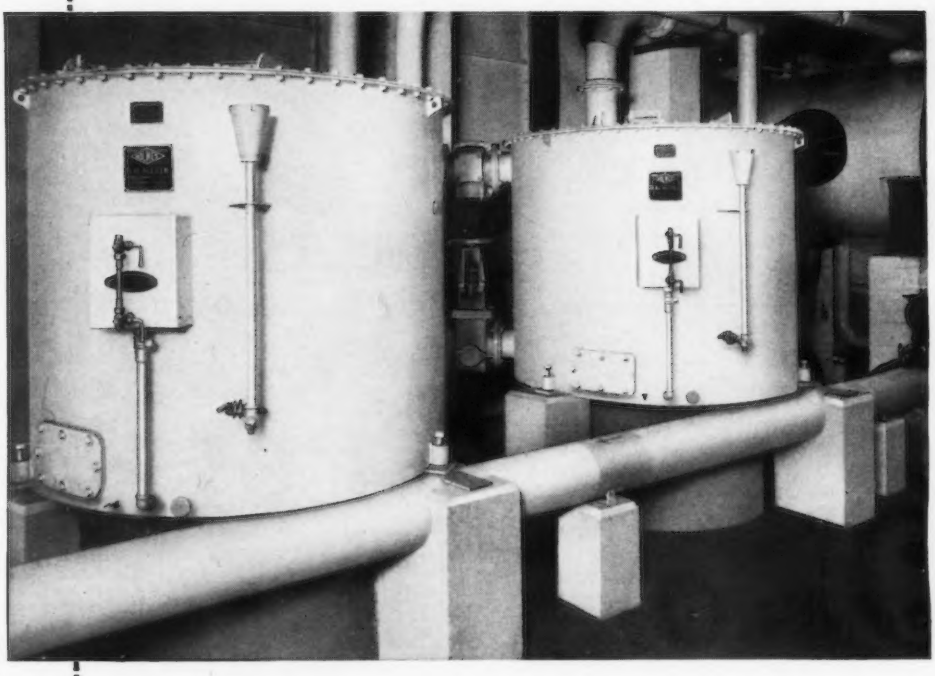
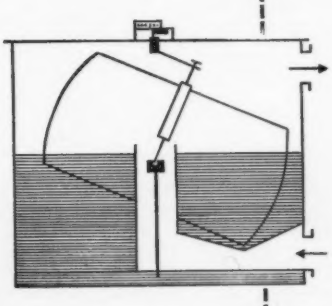
Industrial Consumers METERS

The B. M. Meter is fitted with an automatic levelling device which ensures constant and consistent accuracy, and reduces maintenance to a minimum.





The above illustration shows two B. M. Meters installed at Binns' Store, Sunderland.

For full details please write for Publication No. 51/5

FOUNDED 1850 HOLMES HUDDERSFIELD

W. C. HOLMES & CO. LTD

TURNBRIDGE - HUDDERSFIELD

C4759

industrial gas compressors

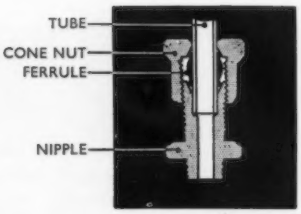
FOR COMPRESSING AIR OR GAS SUPPLIES USED FOR FURNACE HEATING, METAL MELTING, BRAZING, SOLDERING BITS, LAUNDRY IRONS, ETC.

DIRECT COUPLED COMPRESSORS (see illustration right) are fitted with automatic internal by-pass valves and lubrication systems. They are direct coupled to Keith Blackman motors. Type OA compressors in this range occupy a floor space of only 18" x 7½".
CAPACITY RANGE: 100 to 750 cub. ft. of gas or air per hour at 3 lbs. per sq. in. pressure.

TYPE 4 COMPRESSORS (not illustrated) are also fitted with automatic internal by-pass valves and lubricators. The complete unit includes motor and drive on a common bedplate, all of Keith Blackman manufacture.
CAPACITY RANGE: 500 to 20,000 cub. ft. of gas or air per hour at 3-5 lbs. per sq. in. pressure.
AREA OCCUPIED: from 9¼" x 16½" to 61" x 27".

DID YOU KNOW?

KEITH BLACKMAN have been making compression joints for many years and the present design embodies features developed as a result of this long experience. Notice that the shape of the ferrule is such that the joint is made without unduly stressing the tube.



serving to burn

Note: the four burner heads (right) are for high pressure gas, or low pressure gas and air blast.

LEFT: "Fishtail" type burner with two-armed stamped pattern injector for heating liquid in tanks by submerged combustion tubes. For use with low pressure gas supplies. **Size Range:** 1", 1¼", 1½", 2" and 2½" outlets. **Capacity Range:** 45-280 cub. ft. of gas per hour.

Brass non-blow-off head types: deal with 5 to 10 cub. ft. of gas per hour.

Stainless steel, "F" type head, burner: deals with 8 cub. ft. of gas per hour.

Perforated head type burner: deals with 10 to 15 cub. ft. of gas per hour.

Keith Blackman LIMITED
MILL MEAD ROAD, TOTTENHAM, LONDON, N.17
"Phone: Tottenham 4522 (twelve lines). "Grams: "Keithblac, Norphone, London."
BRANCH OFFICES: AT MANCHESTER, BIRMINGHAM, LEEDS, GLASGOW, NEWCASTLE-ON-TYNE, PENARTH near CARDIFF, AND BELFAST

INDUSTRIAL GAS EQUIPMENT

524

Railway Sidings Construction

Design, Installation and Maintenance

The Grant Lyon Railway Sidings installation for the new 60-ton Electric Melting Furnace Project at the Stocksbridge Works of Messrs. Samuel Fox & Co. Ltd. included: lifting 3½ miles of track from old sidings; filling up and making new foundations to a maximum depth of 12 ft. using 15,000 tons of slag; laying temporary track; laying approximately 5¼ miles of permanent track involving 39 leads, 5 tandems, 1 diamond, 5 single slips and 1 double slip.

Enquiries are invited for the design, installation and maintenance of railway sidings.

GRANT LYON
AND COMPANY LIMITED
SCUNTHORPE

Railway and Civil Engineering Contractors
HEAD OFFICE: Scotter Road, Scunthorpe, Lincs.
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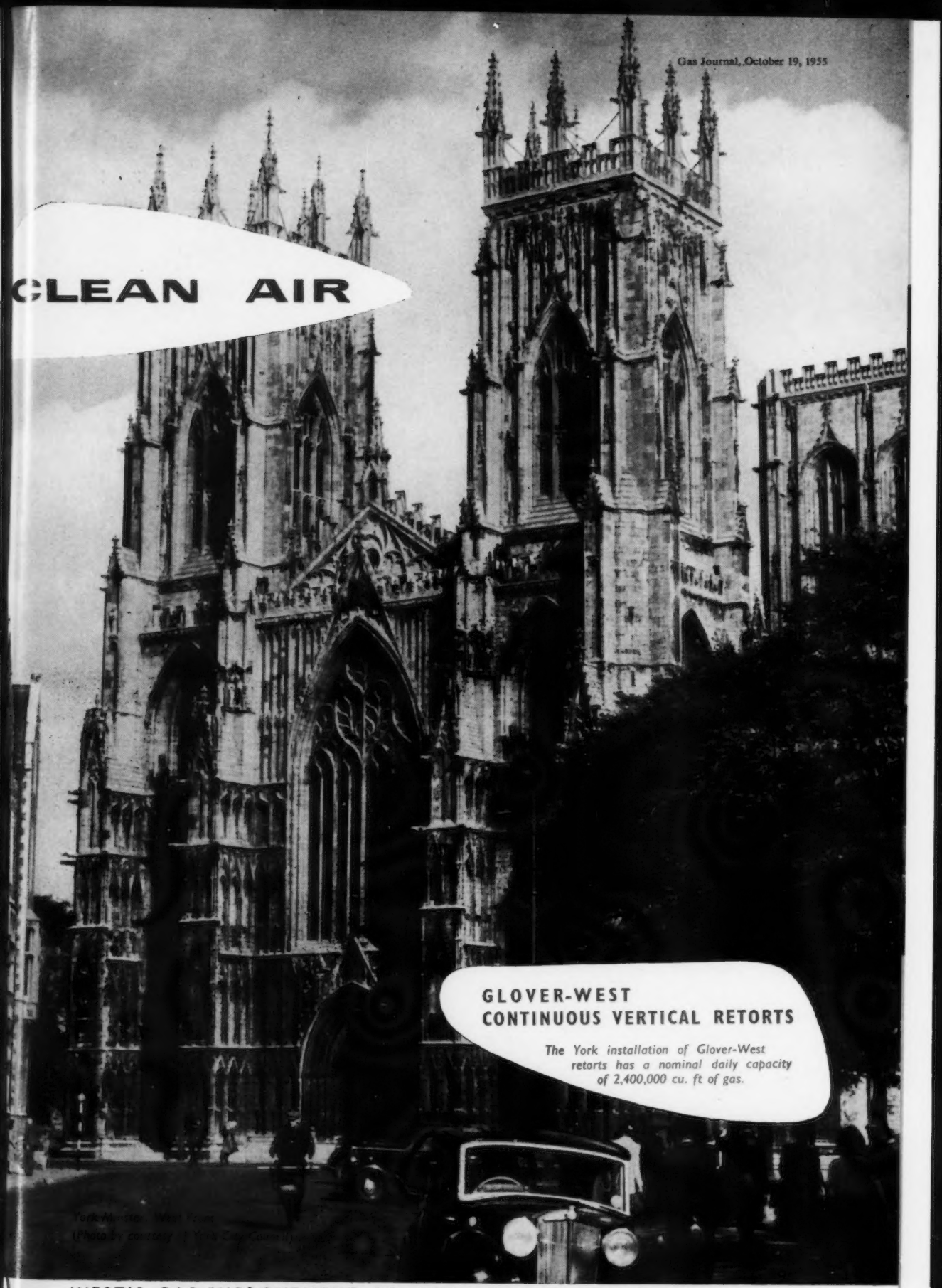
CLEAN AIR
GLOVER-WEST
CONTINUOUS VERTICAL RETORTS
The York installation of Glover-West retorts has a nominal daily capacity of 2,400,000 cu. ft of gas.

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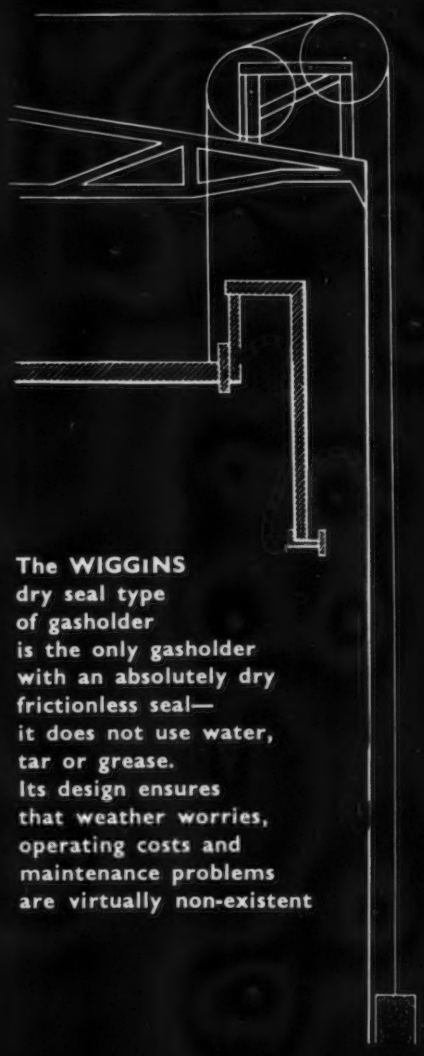
WIGGINS DRY SEAL GASHOLDER



The WIGGINS dry seal type of gasholder is the only gasholder with an absolutely dry frictionless seal— it does not use water, tar or grease. Its design ensures that weather worries, operating costs and maintenance problems are virtually non-existent

The 424,000 cubic feet gasholder installed at the Municipal Gasworks at Silkeborg, Denmark. One of the many WIGGINS manufactured by Ashmore, Benson, Pease & Company with capacities ranging from 50 cubic feet

ABP

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